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BOOK DEPARTMENT

MEDIÆVAL FRANCE. Edited by Arthur Tilley, M.A., Fellow and Lecturer of King's College, Cambridge. 456 pp., 5½ x 9 ins. Price $8. The Macmillan Co., New York.

INCREASED interest which is being felt in studying the period generally referred to as the "middle ages," usually held to consist of those centuries which elapsed between the fall of the Roman Empire and the beginning of the renaissance, is resulting in the publication of a number of valuable works which are concerned with various phases of the subject. "Mediæval France" is a volume which deals with but a single country during this period, and it studies closely the structure of France, civil, military and religious, its languages, the rise and progress of different movements in the social and political orders which affected the lives of the people, and the building up of the foundation of general culture upon which was later reared the splendid structure of France during the renaissance. During a great part of the mediæval period France was the heart and center of European art, philosophy and culture generally, and at Paris there converged the roads traveled by the artists and students of the entire continent.

St. Wulfran's, Abbeville
Illustration from "Mediæval France"

While the major portion of the work is concerned with these general topics, from an architect's point of view at least all this exists merely as a background for the chapters upon architecture and the related arts, which flourish only when the times are propitious and which constitute the permanent expression, visible and tangible, of any age. These chapters are rich in the treatment of their subject matter, and within small compass present a helpful and fairly comprehensive view of the development of the several architectural styles with their more or less local variations, the different schools of sculpture and painting of various kinds, stained glass, illuminating and metal working, and the influence upon all this of the growth and centralization of civil power in the hands of the monarchy.

Architecture of the mediæval period was lavished upon structures of different kinds for ecclesiastical uses—monasteries, cathedrals, chapter houses and episcopal palaces—and its development was influenced to a considerable degree by the growth of the great religious orders such as the Dominicans and Franciscans, and even more so by the various reforms within the Benedictine order and the resulting new foundations of which Cluny was the most important as influencing architectural style. In the eleventh century 314 monasteries obeyed the Abbot of Cluny, who struck money in his own mint like the King of France himself, and within 25 years from its foundation the Cistercian order had spread over all Europe and numbered 60,000 brethren. With the spread of the monastic orders a great school of architecture arose, and while the passion for monasticism was at its height the abbeys, monasteries and other conventual buildings for several centuries eclipsed in size and splendor the cathedrals and churches of the secular clergy. The great minster of Cluny was the

Architecture and Allied Arts of Old Spain

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largest church west of the Alps, and in many ways monasticism left its indelible mark upon the architecture of France. More than in some other countries architecture in France is inextricably a part of the life of a period, and its real spirit cannot be grasped without a study of the history of the epoch of which it forms the enduring expression. By presenting a view of these correlated activities, this work promotes a more accurate knowledge of the architecture of the epoch.

The history of France during this formative period presents many instances which illustrate the marvelous vitality of the nation. A calamity such as the Hundred Years' War would have meant the ruin of many countries, but France recovered, and Dr. Tilley predicts, not without good reason, that the same amazing vitality will raise present-day France and restore her to her place as the leader of Europe.

THE DESIGN OF STEEL MILL BUILDINGS AND THE CALCULATION OF STRESSES IN FRAMED STRUCTURES. By Milo S. Ketchum, C.E. 632 pp. 6 x 9 ins. Flexibly bound in leather. Price $6 net. McGraw-Hill Book Co., Inc., New York.

THIS work is a companion volume to the same author's "Structural Engineers' Handbook," though the two books are independent. The present volume is intended to present within as small compass as possible the calculation of stresses in framed structures and to review the subject of mill construction. In discussing the problems of stress both the algebraic and the graphic methods of calculation are described and illustrated with numerous diagrams, and from text plus illustrations the student should be able to obtain a reasonable grasp of the fundamental principles.

In Part I the author considers the calculation of stresses which occur in simple beams, portals, trusses, the transverse bent and the three-hinged arch. This part contains 40 problems covering stresses in all types of simple trusses. Part II goes into the calculations of deflections of trusses, calculation of stresses in statically indeterminate girders, trusses and frames and secondary stresses in trusses, elucidated by numerous problems and statements of others. In Part III, Mr. Ketchum takes up the designing and construction of steel frame buildings for mines, smelters, mills and other industrial structures, and gives a fully detailed design of a crane girder, a roof truss and a steel building, in addition to discussing the design and construction of floors, roof coverings, foundations, corrugated metal, doors, windows and other related subjects. Being a revision of the work originally published in 1903, this new edition presents the latest practice of engineers and builders in the various phases of work which the volume covers.

THE AMERICAN HOUSE. Edited by Charles S. Keefe. 219 plates, with descriptive notes, 9 x 12 ins. Price $10. U. P. C. Book Co., Inc., New York.

EACH year the work in American domestic architecture shows certain examples which by reason of their excellence in various ways might be said to constitute a class by themselves. These homes are sometimes large, but quite as often they are of moderate size or even small, and their pleasing qualities are sometimes the result of rather close adherence to precedent but at times are due to the free use of motifs from more or less

related periods, handled with the liberty of judgment which would be claimed by anyone of good taste at any period. A collection of plates showing many of these houses has here been brought together, classified as to style. While perhaps no one of the examples included has not already been published in some one of the architectural journals or in one of those publications of somewhat broader scope in which gardening and house furnishing also form part of the field covered, it is useful to have these fine examples collected in book form so that they may be readily referred to.

Mr. Keefe has arranged the volume according to different styles, into one chapter—"Colonial Houses"—there being gathered structures designed in the correct though slightly austere style of New England and other houses in the generous, ample styles used in Pennsylvania, as well as other examples of the southern colonial as used in Maryland or Virginia which exhibit a certain restrained luxury of treatment. More formal are the examples classified as "Georgian," houses for the most part of brick and of small or medium sizes as well as of those of larger extent with which the term "Georgian" is generally associated. Other chapters are devoted to houses of the Italian and Spanish types in which stucco is generally used for the walls and tile for the roofs. Another chapter is devoted to the consideration of houses which do not fall readily into any one of these classifications—several examples of the use of the French types, the styles in vogue in England during Tudor and Jacobean times, and of what is generally called the "modern English" type. An important detail of the book is its presentation of excellent illustrations of interiors, particularly useful since plans of the houses are also included.

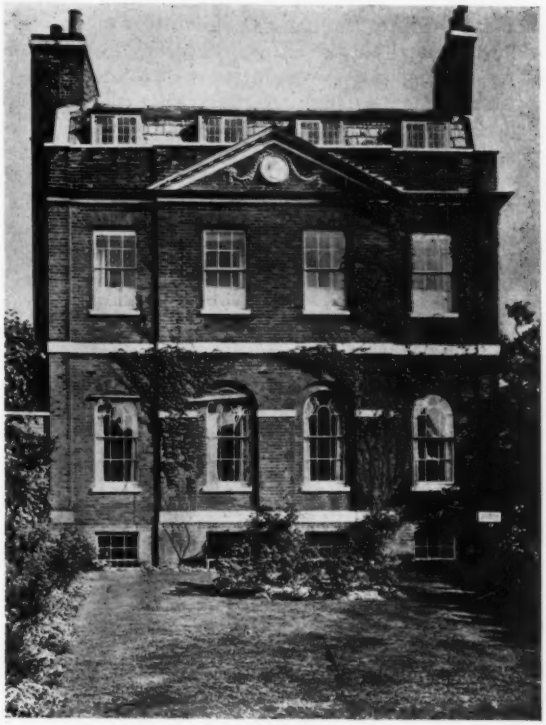
CONSTRUCTION COST KEEPING AND MANAGEMENT. By Halbert Powers Gillette and Richard T. Dana. 582 pp. 5 x 8 ins. Price $5 net. McGraw-Hill Book Co., Inc., New York.

SINCE a large part of success in the field of contracting and building depends upon close economy in cost accounting, it follows that systems for such accounting are of vital importance. The success of the volume entitled "Cost Keeping and Management Engineering," published by this firm in 1909 and reprinted in 1916, has led to the preparation of the present work which sets forth the latest developments in the field. As far as is known this is the first book written on the general subject of cost keeping for managers of engineering construction; such keeping of costs differs materially from systems which might be used to advantage by manufacturers, for example, and in this volume there are reproduced the record blanks or forms used by many successful contractors and builders.

It may easily be seen that a system which is well adapted for a large concern, employing a large staff and engaged in great construction projects in different sections of the country, would be unsuited to the needs of another concern operating upon a much smaller scale, and one chapter of the book is entitled "Bookkeeping for Small Contractors," containing cost forms which have proved to be useful to contracting and engineering concerns in many places. Closely related to the subject matter of the book is the use of various office appliances, such as time recorders and comptometers, and a consideration of their advantages is contained in the work.

Small Houses of the Late Georgian Period

By STANLEY C. RAMSEY



A volume on the small country or suburban houses and town houses, detached or in rows, of the late eighteenth century type, suitable for American use today. The houses shown include those of stone, brick, stucco or clapboards and most of them are designed in the dignified, slightly formal style which marks the Georgian period; some of the buildings contain shops on the ground floors with living quarters above. The volume also contains illustrations of doorways, porticoes, balconies and wrought ironwork of the time.

This book contains no fewer than 130 carefully selected examples of small houses, all finely reproduced to a large size from photographs specially taken for the purpose.

Apart from its immediate practical utility, this book is of distinct educational value, and it will make a strong appeal to all architects, students and general readers who are interested in the Georgian period.

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FORM IN CIVILIZATION; COLLECTED PAPERS ON ART AND LABOR. By W. R. Lethaby. 242 pp., 4¼ x 6¾ ins. Oxford University Press, London and New York.

IT is always a pleasure to pick up an English book of essays, a form of writing in which the English easily excel. While but comparatively few American writers would take the trouble to closely examine a subject and to discover the sources of origin and the real meaning of what presents itself to the eye, the Englishman as a preliminary to writing is apt to conduct a searching examination into the causes which produce a given result, to marshal his data in orderly fashion and, having planned the presentation with due care as to proper sequence, to proceed to develop the subject in a logical way.

Such a work is the volume in hand, a collection of essays contributed to various English periodicals or the revised text of addresses made before different architectural or educational societies. Mr. Lethaby writes much and well on topics more or less closely related to architecture, and much of the interest of his writings lies in the fact that he does not hesitate to call attention to the shortcomings of the age and to compare the present state of things to what obtained in the good old days "when ugliness, and particularly vulgarity, had not been invented." No real progress in any department of effort is to be made until by recognizing the need of progress a vision of better things is presented. Mr. Lethaby's writings are a help in both directions, for besides pointing out the need he discloses a glimpse of what might be. Particularly helpful is Chapter XIV, an essay entitled "What Shall We Call Beautiful?", reprinted from the *Hibbert Journal*.

NEW BUILDING ESTIMATORS' HANDBOOK. By William Arthur. 1002 pp., 4½ x 7 ins. Flexible binding. Price $6. U.P.C. Book Co., Inc., New York.

THE value of this work is abundantly proved by the fact that it is now appearing in its twelfth edition, vastly enlarged since it was first published in 1904 with 150 pages. The volume, "Estimating Building Costs," which was reviewed in these pages in THE FORUM for March, is intended to act as a "feeder" to this larger and more complete work which covers the entire field of estimating all branches of building costs.

As the complexity of the modern building increases the architects and engineers by whom they are planned, as well as the contractors and builders by whom they are erected, find growing need of all the help which can be given them. Cost estimating in this field is both difficult and responsible; even the most experienced estimator is far from infallible, and errors are easily made, sometimes meaning the loss of business through naming a figure too high or, what is perhaps even worse, the taking of a contract at too low a figure and suffering a consequent loss. Estimating is at best exacting and laborious, and any help, short cut or improved, time-saving method which can be advantageously employed will be welcome. To provide this help is the purpose of this volume, and since it has been prepared in view of the experience gained from many years of practice in the estimating field, it abounds in precisely the information which is needed for the successful estimating of building costs. It would be almost invaluable to most estimators and a helpful mentor to those of greater experience. It would also be a valuable addition to an architect's office equipment.

"SCHOOL ARCHITECTURE; PRINCIPLES AND PRACTICES"

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THE EDITOR'S FORUM

THE OUTLOOK FOR BUILDING

THAT the structure of American business rests upon a sure and solid foundation is proved by many facts. Notwithstanding such undeniably disturbing factors as the strikes now in progress at the coal fields and on transportation lines, every consideration points to the settling down of business conditions to what bids fair to be steady prosperity for a number of years.

Conditions, particularly as they relate to the building industry, formed the subject matter of an address by J. E. Rhodes, Secretary-Manager of the Southern Pine Association, delivered before a special meeting of subscribers at Memphis on August 10. The speaker dwelt upon the fact that during the first six months of the present year in 163 American cities and towns building permits to the value of a billion and a quarter dollars were issued, an increase of 75 per cent over a like period in 1921. This large increase in building construction is not confined to value but applies as well to the number of square feet of floor space. Conditions among manufacturers of building materials point to prosperity almost without precedent; that bumper crops are general this year, the result of highly favorable growing conditions during July, was indicated by the government's August crop report; bank clearings, always an infallible indication of a country's prosperity, show figures which would justify a high degree of optimism.

RESOLUTIONS BY BOSTON ARCHITECTS

EXPRESSING its position on several questions now being widely discussed and involved in a trade agreement under negotiation by the employer and labor groups of the building industry, the Boston Society of Architects issues resolutions adopted June 29 by its Executive Committee.

These resolutions deal with the items of wages, hours, overtime, apprentices, duration of agreements, and settlement of disputes, and under each heading there is explained the position which the Society assumes. In the matter of wages there is deprecation of the granting of a material increase over the present wage rates being urged in view of the present demand, and particularly of the establishment of a permanent wage-scale determined upon the basis of a temporary, abnormal and partly artificial condition. In the matter of working hours the position taken is that a 5-day week for certain trades is not only unnecessary but illogical unless such a week is granted to all the trades in the building industry, which is not now being urged. The resolutions point out the tendency of a 5-day week to increase the number of workmen engaged, to create a need for overtime labor at a much higher cost, and as generally placing a burden of expense and confusion on the industry without to any degree improving the conditions of seasonal unemployment.

The immediate attention of both employers and labor is directed to the speedy development of a steady supply of properly trained workmen, vitally necessary to the proper growth of the industry. The resolutions maintain that agreements should have a greater degree of permanence than is now customary and should contain within themselves means for the periodic adjustment of wage scales instead of being made for short terms and subject at their expiration to debate and renewal, often under the stress of temporary conditions. Recognition is also made of the need of a permanent system of arbitration for the adjustment of disputes.

MANUFACTURERS' ADVERTISING TO ARCHITECTS

MENTION has already been made in THE FORUM of efforts now being directed toward co-operation between advertisers and architects. This movement has now led to the creation of a Producers' Section of the Committee on Structural Service of the American Institute of Architects to outline plans as to the character of such advertising, particularly as to size, form and content of printed matter and as to furthering the use of the Standard Construction Classification already adopted by the Institute.

Unless one were familiar with the subject it would be difficult to realize the waste and extravagance which have long characterized the advertising which manufacturers of materials have issued to architects and engineers, such advertising often taking forms which are wholly impractical or else failing in some other way to meet the needs of the profession. The most unfortunate part of the situation is that architects are only too ready to welcome and use advertising which gives promise of being really serviceable in any way. Proof of this is found in the care with which some particularly valuable bit of advertising matter is treasured in an office for many years and through various changes of administration.

This Committee has now under review the entire subject of advertising in its relation to architects, and recommendations may soon be expected looking to the promotion of closer relations between manufacturers and architects and co-ordination of efforts which will insure the presentation of data and information in just the manner and form which will render it most useful.

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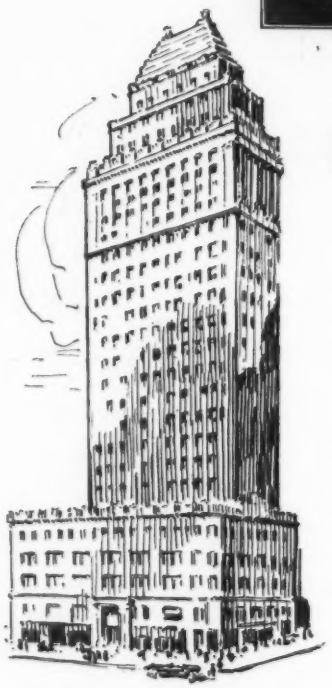

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VOLUME XXXVII NUMBER 3

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ALBERT J. MacDONALD, Editor

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DETAIL OF TEMPLE AT THE BIRTHPLACE OF CONFUCIUS, CHEFU IN SHANTUNG

Dragon heads on the stone terrace simulate the carved beam ends of early wood construction. Foliated motifs are profuse in proximity to the structural shapes, as in the lotus headed posts or carved facia behind the figure.

Photographed by Edwin L. Howard

The ARCHITECTURAL FORUM

VOLUME XXXVII SEPTEMBER 1922 NUMBER 3

A Chinese Temple in Formosa

By K. W. DOWIE

THE well known conservatism of the "heathen Chinee" is nowhere better demonstrated than in the art of building. In other countries to see a building is to be able to date it fairly accurately, but in China the same rules have been adhered to for so long that the appearance of a temple such as that described here gives us no sort of clue as to whether it has stood for 30 years or a thousand. Obviously, however, a type of architecture which could endure for so long must have its good points.

A Buddhist temple of the type usually found on unrestricted sites, it is beautifully situated on the side of a little hill, facing southwest. Temples in crowded towns usually do away with all but the center section, enclosed between the two long walls, and the priest or caretaker sleeps on a bed placed in the rear, not far from the chief idol; here the caretaker has a whole wing to himself, and another wing is rented.

The plan is simple, the worshiper passing through a highly decorated entrance porch to the inner arcades leading around the unroofed court or impluvium to the main building in the rear. As the altar containing the chief idol is placed against the rear wall, where no light can penetrate excepting from the impluvium, we have an effect, doubtless sought for, of gradually increasing darkness and mystery as

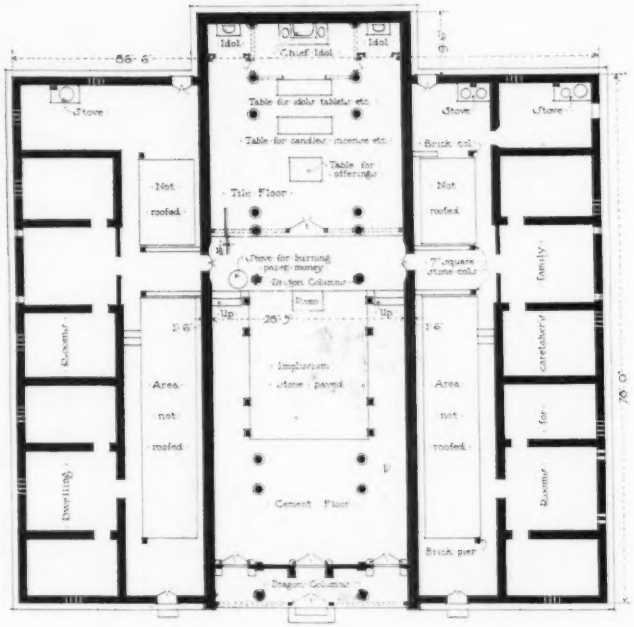
The Prevalence of Earthquakes Has Kept Chinese Buildings Low, Affording a View of Their Roofs Which Are Often of Striking Beauty

Detail of Dragon Column and Brackets in Rear.
All Brackets Are of Wood and Gaily Painted

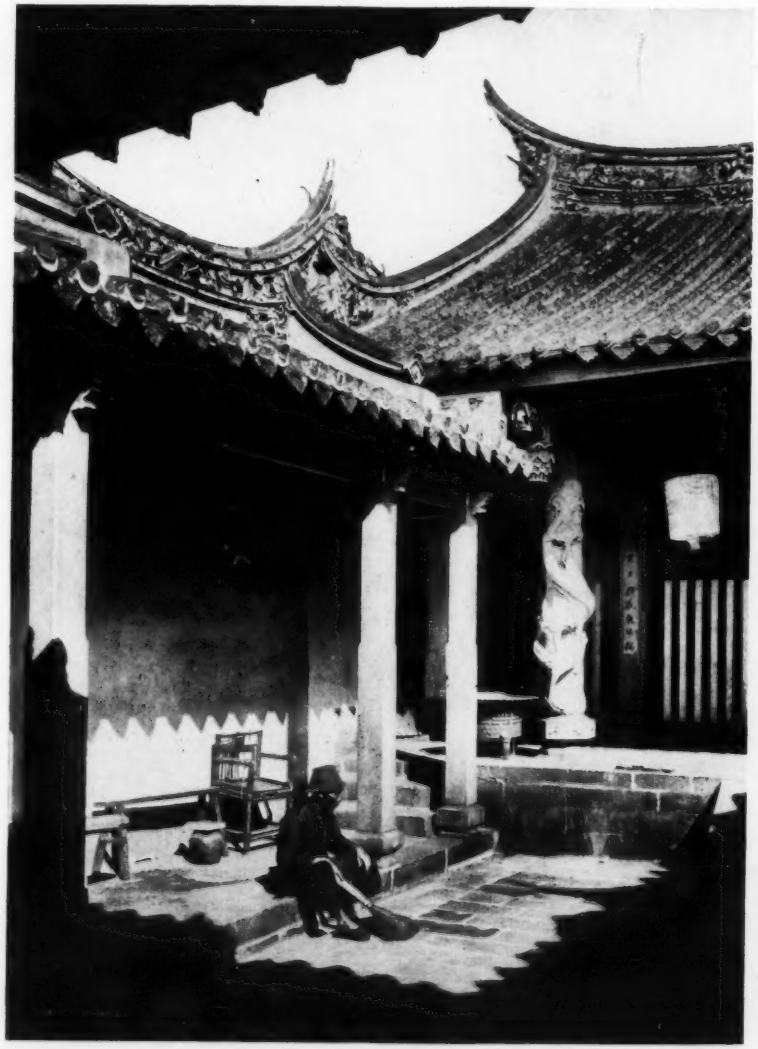
the idol is approached, reminding us of the temples of Egypt. In scale, however, there is no temple in China which can compare at all with the great buildings of Egypt or Greece. Chinese materials, too, are more perishable. Worship in China is for the most part individual, and its paraphernalia is very simple, consisting of a table for the god in a small space curtained off from the rest of the building, with other tables in front for tablets, idols and incense, another empty table upon which the worshiper may place his offering (usually of food), and a stove where he may burn imitation money. This stove is as often as not without a flue, the smoke escaping through the impluvium.

Foundation walls are of cobble stones, and those above these are either of brick plastered over or of a thick tile 7 x 9¼ x 2¼ inches; courses of headers alternate with tiles set on edge, the hollow voids being filled with mud and pebbles. Variations in color provide a most interesting wall surface. This material being scarcely strong enough for door jambs, they are usually made of brick. Door heads are beamed in stone, with occasionally a semi-circular brick arch. In warm localities, the windows shown on front and sides, consisting of three or four narrow slits 4 inches wide, exclude the worst of the heat and at the same time satisfy Chinese demands as to the amount of light necessary, so there is no great objection to them. The Chinese, however, have conceived of nothing better than these for their sleeping rooms, which constitutes a serious menace to health.

Important columns are always of stone. Dragon columns, made of one piece of stone and representing the labor of one artisan for nine months or a year, may still be made for a comparatively small cost and are a product of the age-old system of apprenticeship still in force in the various guilds. Notice the simple chamfering of the corners of square columns, producing a sort of imitation entasis on the diagonal view. All columns are made without caps. The universal practice is to stop the stone column a couple of feet below the roof brackets and to splice it there to a wooden column of equivalent section, so that this latter may be mortised to receive the wooden brackets supporting the roof. These brackets are often of great beauty, as may be seen from the illustrations. After being elaborately carved in full relief they are covered with bright paint with reds, blues and golds pre-



Plan of the Temple and Its Accessory Wings



Looking from the Entrance Porch Diagonally Across the Impluvium. The Caretaker Is Also the Priest

Detail of Entrance, Rich and Gorgeous with Correct Architectural Lines and Lavish Use of Color and Gold

Looking from the Impluvium towards the Entrance Porch

dominating. A remarkable feature in Chinese architecture is the complete absence of the truss. Not only this, but it seems never to have occurred to these builders, as Russell Sturgis points out, to use a diagonal tie or strut of any kind. Brackets are always rectangular, a system resulting in great extravagance in the use of lumber in all their roofs, though certainly producing an effect more harmonious and restful than that caused by diagonal members, and at the same time satisfying the demands of the eye as regards strength.

The point where the Chinese "lets himself go," however, is on the ridges. Hip roofs are usually avoided, the delicate curves of ridge and gable eaves giving a very distinctive note. These ridges are built up of brick and cement, reinforced by iron rods at the turned-up corners. Dragons perched jauntily near the ends of the main ridges keep away evil spirits, and a brilliant color effect is given these and the ridges themselves by a covering of broken bits of glazed tiles of various hues. Tiles in Formosa are thin, and laid with from 2½ to 3 inches to the weather. Pan tiles have a very slight curve to them. In ordinary work, cover tiles are of the same section, laid reversed, but in the main temple roof a nearly circular cover tile will be seen, with a treatment of the eaves that gives a most interesting shadow.

Inscriptions, whether written on cloth banners, carved on stone columns, or carved out of wood and suspended in appropriate places, are a striking feature of interiors, and each character is a work of art in itself. To quote from Chamberlain in regard to Japanese writing, which of course is based on the Chinese: "If this writing is to us a mountain of difficulty, it is unapproachably beautiful,—above all, it is bold, because it comes from the shoulder instead of merely from the wrist. A little experience will convince anyone that in comparison with it the freest, boldest English hand is little better than the cramped scribble of some rheumatic crone. One consequence of this exceeding difficulty and beauty is that caligraphy ranks high in Japan (and China), included among the arts." The inscription seen over the tables in front of one altar reads: "Great virtue will save the Universe," surely a laudable, if noncommittal, sentiment! The beauty of the paneled wood screens in Chinese temples needs no comment. Altar tables are sometimes elaborately paneled in front, with full relief wood carvings, the cost running as high as $1,500 or $2,000 for a single table.

It may seem a far cry from the architecture here illustrated to what we require to meet our needs in America, yet there are many ways in which Chinese examples can help us. Surely there is something to be said for making the roofs of our one- and two-story work more interesting. There seems to be in Oriental peoples an unerring instinct for balance and proportion, shown in their massing and extending also to matters of the smallest detail, as will be seen by a close examination of any Chinese ideograph. In this utilitarian age it is refreshing to turn to a building where the religious impulse compels the builder, and where things are made as they are for the sheer delight of having them beautiful.

These ancient temples were built before the beginning of the trades unions, and their architects were undisturbed by strikes; but even in the "unchanging East" conditions are changing, and Chinese architecture is gradually losing something of its charm as fashions come in from the outside.

BUSINESS & FINANCE

C. Stanley Taylor, *Associate Editor*

Architectural Design and Structural Requirements of Loaning Institutions

ONE of the important elements of progress indicated in the present period of building activity is the enforced improvement of building design and construction developing through the pressure of loaning organizations.

From the architect's viewpoint it is important to realize how definitely this power is being exercised and developed. Unquestionably during coming years higher standards of plan efficiency and more rigid requirements of structural integrity will be employed by those who acquire buildings as collateral for loans. Consequently, a rapidly developing architectural service requirement is the provision of building plans and specifications which will encourage more favorable appraisals.

Architects will receive many practical suggestions from this article which presents the methods used by the Metropolitan Life Insurance Company for protection against bad building and mortgage loans.

THE volume of new building operations which has developed during the past 18 months offers an unparalleled opportunity for analytical study to determine basic trends, dependable policies and modern developments in the construction industry. There can be no question but that many precedents are being established at this time and that improved relations are being developed between the important elements of building finance, design, construction and maintenance.

Among the factors which are contributing more strongly than ever before toward increased efficiency of purpose and the elimination of waste in building space and investment is the establishment of more exact requirements on the part of loaning institutions. Finance, the strongest influence in the building world, has power to establish high standards of design and construction in all classes of buildings throughout the United States. Judging merely from a business point of view, the controllers of finance are wise to encourage high standards of design and construction, because the best security for a mortgage loan is a well planned and durably constructed building. Architects too are deeply concerned in better standards of building, and they will unquestionably approve of the requirements of loaning institutions which tend to encourage and secure a greater appreciation of architectural design and structural integrity.

At this point we wish to emphasize the growing appreciation by loaning institutions and real estate interests of the value of good architectural design, particularly that element of design which may be termed planning efficiency. An analysis of existing buildings unquestionably shows that there are two great elements of structural waste in the United States. The first is that of waste space due to inefficiency in planning, and the second is that of rapid obsolescence due to poor construction. Good architectural design is a general term conveying different meanings to different classes of individuals. In years past the term good architectural design carried principally an æsthetic meaning and developed varying degrees of appreciation on the part of the building public and of loaning institutions. These institutions are learning to interpret the term good architectural design as meaning not only æsthetic quality but a high degree of practicability in the laying out of space in a building. The average loaning institution would not call a building good from an architectural viewpoint even though it possessed the æsthetic qualities of a masterpiece in design unless it were well planned. Conversely, it would not term an ugly but practical building good architecture. Loaning institutions are learning to recognize fully that point at which good design and efficiency of purpose may unite to create the type of building which will meet with public favor and consequently maintain its collateral value even during periods of inactivity in the real estate market.

One important question for the architect to decide in relation to this demand is whether he will become its leader or its servant. We have in the architectural profession outstanding examples of leadership in the development of beautiful and practical buildings. The profession can, without undue egotism, take credit for a large share of the progress in modern building construction. It is therefore a commendable condition that loaning institutions and building owners are learning to appreciate the benefits to be derived from real architectural service which can be directed by constructive imagination to justify loans and investments without sacrificing those qualities of proportion, scale and harmonious color which should influence all city and suburban districts in the matter of building development. We may therefore assert without qualification that loaning institutions are

learning to place a practical valuation on good architecture in its broadest sense. An excellent example of this condition may be presented by a consideration of the experience of what is probably the greatest loaning institution in the United States —the Metropolitan Life Insurance Company. This company has set a fine example and one of far-reaching benefit to the architectural profession, first by making use of the services of an architect to aid in safeguarding its building loans, and second, to encourage the development of definite requirements which tend to secure good construction.

An application for a building and permanent mortgage loan submitted to the Metropolitan Life Insurance Company passes through two stages of consideration. These stages might be termed the business analysis and the technical analysis. The business analysis is made by the department headed by Walter Stabler, the comptroller of the company. In this department the feasibility of the building's location and plan is considered. If it is a building designed for investment purposes a careful study is made of the possibilities of rental income, maintenance cost and other items which go to make up the building manager's statement, and which determine the success of the building from a business viewpoint. In this article, however, we are more directly concerned with what we have termed the technical stage of considering a loan application. This relates to architectural design (in its broadest sense) and the construction and equipment of the building. This is the department directed by D. Everett Waid and fully described here.

Naturally these two departments co-operate closely in the consideration of a mortgage loan application, and the fact that considerable stress is laid upon efficiency of planning can be no better demonstrated than by referring to the unusual building venture for which the Metropolitan Life Insurance Company has broken ground in New York within the past few weeks. This is the construction of a large group of apartment houses designed by Andrew J. Thomas, an architect of New York who has devoted years to the study of efficiency and space-saving in the planning of apartment houses, and Mr. Waid, as architect for the buildings erected by the Metropolitan Life Insurance Company. Through his years of experience in the consideration of plans submitted for mortgage loans he has had an unusual opportunity for a first-hand study of practical planning and practical construction methods. The plans of these buildings and a description of the project and its purposes were presented in the July issue of THE FORUM.

In considering this developing relation between architecture and finance it is significant to realize that although the building world has only recently been aroused to the need of more accurate methods in building finance, the officers of the company years ago perceived the serious losses which are sustained by placing mortgages on defective buildings. Beginning in 1902, they commissioned Mr. Waid to review drawings and specifications of new buildings which were prospective security for the company's mortgages. Mr. Waid's work has been singularly successful, and today his system is so well established and has been so well tried out in practice that its exact method of operation should be widely understood among architects, because if its use became general, architecture would benefit immensely, perhaps more than by any other means.

In order to understand the character of the Metropolitan's financial policies in regard to buildings, one may do well to compare them with the methods in common use among lending institutions. Most interests exercise some supervision over their loans, but the extent of this oversight varies greatly. In too few cases can it be said to include scientific appraisal. Too often a property is appraised in a general way, the individuals who place the loan judging as well as they can the value and desirability of the site, the general suitability of the design of the building for the purposes intended, and the financial standing of the builder or of the investor who is responsible for carrying out the building operation. Having taken these precautions, the mortgage company usually endeavors to protect itself further by requiring a heavy amortization of the loan. Such a method may have been thought satisfactory in former years when the principles of real estate operation were not so well understood, but today the great increase in cost of construction and the costs of operation and of maintenance, together with the remarkable progress made by architects toward more economical design, have awakened financial interests to the need of being more careful in placing loans.

It is quite apparent, therefore, that exercising judgment as to the general character of the design is not enough. A more scientific method is required which shall accurately determine the bearing of each feature and each detail of the design and of the construction on the financial value of the building. In such a method of survey a most important consideration is the economy of the architectural plan. A building must compete with other buildings of its kind, and its promoters should make a minute cost-and-income analysis of the architectural plan in order to determine whether it contains any waste space which may lower the income or whether it has other plan defects which may make it less desirable in the eyes of tenants and hence threaten vacancies or a lowering of the rental scale. Defects such as these cannot be reached by amortization. Although good in itself, amortization is often used in real estate as a means of passing on the risk to the builder. It is not sound business. Indeed, many communities are burdened with uneconomic real estate which causes loss indirectly to the financial interests through the blighting effect of depreciated properties in their neighborhoods. Anything which injures the prosperity of a community injures the financial institutions in the community. Particularly is this true of hous-

ing. Wherever too large a proportion of salaries and wages goes into expensive housing, every business and industry in the community suffers.

These general principles, which should be applied in judging the value of a building on which a loan is placed, are highly developed in the system employed by the Metropolitan, in striking contrast with older rule-of-thumb methods. Like any efficient method of review of so complex a thing as a building, the distinguishing feature of the Metropolitan's system is its thoroughness. Mr. Waid follows a building project carrying a Metropolitan loan, beginning with its earliest inception and continuing through all stages to completion. Often a builder approaches the company before his architectural plan is worked out, with the purpose of finding out whether its officers are favorably inclined to lend on a building of a certain type in a specific location. In such a case, the prospective borrower is often informed that a loan will be made on the proposed building with the proviso, embodied in the loan contract, that the drawings and specifications shall be subject to the approval of the lender's architect. If the working drawings are completed at the time the application for the loan is made, Mr. Waid reviews them and he may approve the drawings and specifications either as presented or with certain modifications or revisions—or he may disapprove them entirely, in which case the loan is then refused by the company. It is more satisfactory both for lender and borrower if the loan is applied for before working drawings are developed.

Mr. Waid keeps in touch with the architect as his design progresses, making a few suggestions or criticisms, and occasionally requiring incorporation of features which he deems essential to the success of the building, which works for the best interest of both owner and lender. To facilitate this co-operation, Mr. Waid sends to the owner a "form letter" which varies with different kinds and grades of buildings. This form letter is in reality an outline specification and covers only important points which, experience shows, are frequently overlooked or else wrongly specified. It comprises seven pages containing a list of routine requirements which the designing architect can embody in his drawings and specifications; and, it may be remarked, he may easily secure a waiver or modification of any requirement if he has adequate reasons for so doing. It is not possible to give all the points of the form letter here, but a typical paragraph, showing the requirements in respect to window frames, may be quoted:

"Window frames shall be made tight with proper stops in brickwork and calked with oakum and pointed with Portland cement mortar under the outside staff bead, which bead shall be specified tacked on at the mill. Jamb lining or outside casing of all window frames shall project an inch into the brickwork, and care should be taken to see that the brickwork is built around this projection and not carried up with a straight jamb back of the projections. When, for any reason, such projecting member is wanting, frames shall be required to be anchored by means of a strap iron built into the brickwork. Window frames shall be carefully inspected as soon as delivered in order that defective sills, jambs, etc., may be rejected before the frames are set. All window sashes shall be equipped with approved metal weather strips."

In addition, specifications must be submitted to Mr. Waid covering the mechanical equipment and painting and plastering, and these details:

Surveyor's map, foundation work, details of door jambs and similar details including kalamein trim, details of fireproofing such as floor arches and column furring, shop drawings of fire escapes, complete plans of water piping showing locations and sizes of all hot and cold water piping, heating plans similarly complete and details of any vault lights.

Samples of certain materials must be passed on by Mr. Waid's office, among which are face brick, fireproof doors, corner beads, all hardware, elevator door hangers, marble and mosaic.

It will be seen from this that Mr. Waid, as the architect for the company, and working for the best interest of the borrower who pays his fee, keeps a firm hand on the preparation of all the details of design and construction. But even this does not complete the process. The inspection is carried into the field, extending to all the details of construction. The work is inspected at frequent intervals, as the needs require, sometimes as often as once or twice a week. Experience has proved that there are certain stages in the construction in which special inspection is required. Particularly important is the inspection of the bottoms of excavations before the footings go in, in order to make sure that the soil will carry the loads. It is surprising how often this principle is disregarded, and Mr. Waid accepts no excuse for not informing his office so that his inspector may see every trench and pier bottom. In one case where a contractor neglected to do this, Mr. Waid ordered a large footing in place to be blasted out, and found that the bottoms were insecure, thus amply justifying his action.

Mr. Waid's representative is also present when important tests, such as plumbing tests, are conducted. Experience has shown how necessary are the plumbing tests. A water test is required on all lines, including the soils, since defects in soil piping may permit the escape of gases in the building for an indefinite period. The smoke test has been found to be essential as the only way to detect defects not apparent on the surface. Furthermore, Mr. Waid will not accept even the official test of the local plumbing authority, because such tests sometimes turn out later to be faulty. All these steps requiring Mr. Waid's approval are necessary before the builder can obtain the installments on his building loans as they fall due. Advances are made by the Metropolitan Life Insurance Company on Mr. Waid's certificate in the same way that, ordi-

narily, the client's payments to a contractor are made on his architect's certificate.

In this system of passing upon loans Mr. Waid's relation to the architects employed by investors seeking loans deserves explanation. Always Mr. Waid encourages borrowers to avail themselves of complete architectural services in the usual way, for it is against his policy to furnish architectural services to borrowers. One may surmise that more than once builders have attempted to make use of Mr. Waid's services, seeking by this means to eliminate their own architects during construction. Mr. Waid's services are therefore in the nature of inspection or supervision. His form letter, already referred to, explains, in the very first paragraph, the whole situation:

"In connection with the loan which I understand is to be made by the Metropolitan Life Insurance Company, upon the above named property, I should be pleased to receive your assurance that the architect of your building has been retained to supervise the construction, since I do not in any way try to relieve him of his full professional responsibility in design and supervision."

Mr. Waid urges upon the investor the value of having an architect supervise construction, and in addition, on important work, of employing a clerk of the works. His relations with architects of the better type are very cordial, and it may well be understood that any reputable architect is only too glad to have an architect insisting, on behalf of the financial side, on high standards of construction. Not only that, but many speculative builders, through their experiences with Metropolitan loans, have come to realize the financial value of higher standards and, in more than one case, have taken pride in erecting better buildings.

Looked at in a broad light, financier, architect and public in any community together suffer losses if irresponsible real estate speculation prevails. The old-fashioned speculator built to sell immediately, and he cared little for either an efficient architectural plan or for durable construction. He could sell to investors who had no way of analyzing thoroughly the financial value of an architectural plan and who were inexperienced in deciding how far durable construction cuts down operating cost. But, even where the speculator may unload, the mortgage remains on the property, and also the bank's risk. A low percentage of mortgage is not always sufficient protection for a loan, since experience has shown that a poor building may lose its equity above the first mortgage in a surprising way, until foreclosure results. Hence, even if we selfishly ignore the interest of the owner of the equity, there is need for a thorough architectural inspection of design and construction by an experienced architect. If the practice of the Metropolitan Life Insurance Company proves anything, it is that services such as Mr. Waid's furnish the best safeguards for mortgages in which savings, insurance premiums and trust funds are invested.

Building at Broadway and 70th Street, New York, before Altering for "The Embassy"
William H. Gompert, Architect

The Embassy Hotel, New York

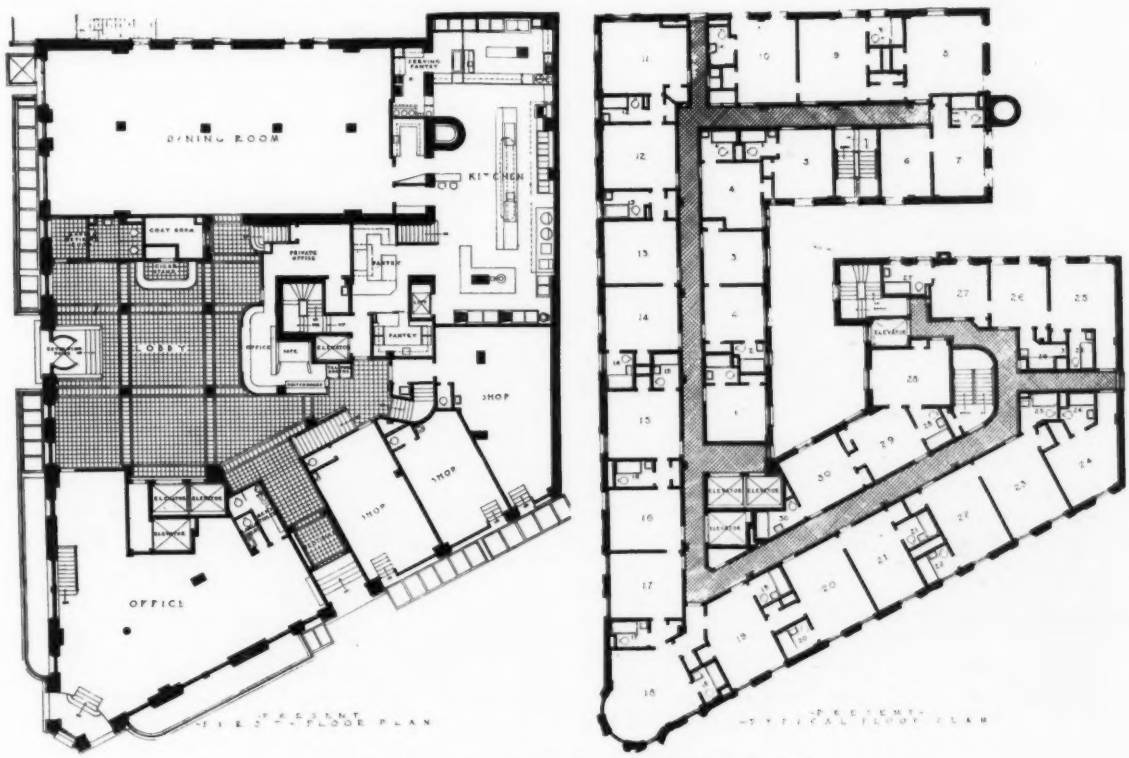
A SUCCESSFUL REMODELING OF AN OBSOLETE BUILDING

WILLIAM H. GOMPERT, ARCHITECT

WHILE a great wave of speculative building has been sweeping the country, and every possible encouragement has been given to the building industry by both legislative bodies and corporations controlling large public and semi-public funds, very little consideration or help has been given owners of old structures. If some form of tax-exemption were applied to rejuvenated old properties, and to further reward an owner if a successful alteration were made, changing the character of the occupancy from one type to another, it would often prevent serious depreciation of values in a locality and frequently completely alter the character of a neighborhood where deterioration has set in; it would further result in the renovation of dilapidated structures, thus tending toward a higher realty standard and making possible increased valuations for taxation purposes.

The great opportunities and possibilities which lie in altering a large, obsolete structure are exemplified in the Embassy Hotel at the southeast corner of Broadway and 70th street, New York. This is one of the largest reconstruction projects undertaken in New York in the last decade, and it is the first instance where a building has been altered from apartments to a hotel since the New York Building Code has required that an owner secure a certificate of occupancy when changing the character of tenancy from one type to another. The old structure was obsolete in type and was not producing a proper return on the investment, due to the fact that while the building when originally constructed about 22 years ago was the last word in apartment house planning, it had become so antiquated that a profitable rental could not be secured from the apartments. To overcome this condition it became necessary to radically alter the plan of the structure and give careful consideration to the utilization of space within the limits of the exterior walls, which could not be readily altered excepting at prohibitive expense.

Before the alterations were made the building was a continual source of worry and annoyance in an effort to keep the apartments occupied by desirable tenants and to meet the ever-increasing cost of maintenance and overhead expenses. From this condition the figures shown upon the balance sheet were immediately reversed, since the owner succeeded, before the alterations were completed, in renting the entire building on a long term lease and on a basis which gives an unusually profitable return on the entire investment.



Service and Room Layout Devised for the New Embassy Hotel

View of the Present Embassy Hotel
William H. Gompert, Architect

The size of the structure can be judged from the fact that the building covers an area of about 12,000 square feet. The original structure was 10 stories in height, to which two stories were added, making a 12-story hotel. The old building accommodated three families on a floor or a total of 30 families. The structure now contains 330 guest bedrooms and 275 baths. Careful attention was given the exterior architectural design which presented problems as unusual as those encountered in the planning, due to the reconstruction of the building. Before designing the two new stories the architect endeavored to find a face brick in the present market which would match in color and texture those used in the building 22 years ago, but since this was impossible he decided to adhere to the general renaissance motif, and the two new stories were designed and built of terra cotta so as to obviate the necessity of matching the old brickwork.

In approaching the problem as to the best method of effecting economy of area it was decided to eliminate all features which occupied an unusual amount of space, and therefore all mantels, fireplaces, recessed basins and sliding door partitions were entirely removed. To illustrate the attention given details several instances might be cited to show a more economical utilization of space. An elevator was removed which permitted the installation of two bedrooms, two bathrooms and two closets; by the removal of an old staircase and another elevator it became possible to plan two bedrooms, two bathrooms and two closets in almost the identical space. Economy of area was further effected by the removal of two old passenger elevators and installing three passenger elevators, grouped in a space which was not suitable for guest rooms. To summarize the results accomplished in converting lost space into income-producing areas, attention is directed to the fact that the old apartment building contained 27 rooms and 6 bathrooms per floor, whereas the hotel now contains 30 rooms per floor, with 25 baths. A commodious closet is provided for each room.

In many instances throughout the structure the result of the progress made in building construction in the last 22 years is evident; three high-speed passenger elevators have proved adequate for the occupants of 330 rooms in the 12-story hotel, whereas the two hydraulic elevators gave very poor and inadequate service when supplying only 30 families in the old 10-story structure. The old building was equipped with three boilers of antiquated type and an electrical generating plant. The boilers were so situated that a cramped condition existed which increased the operating expenses. In almost the identical space there are now located two modern, high-pressure boilers which perform full duty and not only supply steam heat for the building but also the steam power for the mechanical equipment of the hotel including kitchen, bakery, laundry, etc. The old electrical generating plant was entirely removed.

The pumping installation throughout the building is entirely new, excepting that it was found practical to use some of the old cast iron pipes, after burning out the sediment and corrosion. The bathrooms and toilets are ventilated mechanically by vertical ducts connecting with a main duct concealed in the hung ceiling space over the 12th story and with the exhaust vent located in the deck house on the roof. While the building is equipped with a sidewalk lift for the removal of ashes, in addition to this there is a pneumatic tube from the ash pit in front of the boilers to the sidewalk so that the ashes can be removed by pneumatic process.

The importance attached to this reconstruction project lies in the fact that it is a successful rehabilitation or rejuvenation of what was formerly a very sick and *passé* building, the result being secured at a very material saving, since a large part of the heavy structural portions of the edifice was retained as originally planned. Buildings erected 20 years ago or more were often of a quality which renders careful remodeling well worth while, and the economic value of a building when placed upon a profitable financial basis is apt to well justify the expenditure.

Memorial Town Halls in New England

By WILLIAM ROGER GREELEY

THE Bureau of Memorial Buildings of the War Camp Community Service issued a pamphlet some time ago dealing with community buildings as war memorials.

This idea of a community building is vague and idealistic, excepting perhaps in New England. The New England town has had from the very first just such a building, although it has never been called by that name. The New England communities were hardly settled before the freeholders got together and established a form of government which we think of as a simple democracy. They built themselves a meeting house to serve all the purposes of government, social life and religion. On week days they met in a single room to vote on political measures, including the purchase of land for the town common or commons and of a wood lot for the use of the settled minister. They elected fence viewers to settle lot-line disputes, field drivers to gather together stray cattle, and pound keepers to watch over the cattle in the pound until the owners claimed them. On Sunday in the same room they gathered, morning and afternoon, to listen to their minister. The government of the church and town were one, and so the meeting house was a community building in a fuller sense than any that we have had since. Outside the first meeting house there was a row of hitching posts, as the voters came on horseback, owing to impassable roads. Later on a row of horse sheds was added. Such was the simple equipment of the early community building.

Many of the New England towns today are forced by the universal suffrage to give up the simple democracy and have recourse to a limited or representative town meeting. This reduces the number of voters without changing the form of the meeting or the conduct of town affairs, and makes it possible to house under one roof all those who are to participate in the meeting. The town hall of today, instead of having the one room of the early settlers, must satisfy a long list of departments and requirements. Among these may be mentioned:

1. The hall. This is for meetings, for elections and for many non-political uses, among which are theatrical and moving picture entertainments, dances, celebrations, lectures, concerts, etc.

Hearing Room, Town Hall, Arlington, Mass.
R. Clipston Sturgis, Architect

General View of Town Hall, Arlington, Mass.
R. Clipston Sturgis, Architect

2. The town office. This general office is usually occupied by the town clerk and his assistants, if he has any.

3. The selectmen's office. This may be made large enough to serve as a small committee or hearing room. It must have a vault for records.

4. Office of the treasurer, auditor and accountant. These officers have charge of the town finances and must have a vault.

5. An office for the collector and assessors, with vault.

6. An office for the board of public works, which has charge of the water, sewer and road departments and other minor engineering work, such as small bridges and culverts.

7. An office for the town engineer and his draftsmen, if any.

8. Sealer of weights and measures. This officer must have some small equipment, although his work is largely done outside.

9. Quarters for inspectors. Various inspectors require only desk room, and all of them can occupy one large office. They include inspectors of buildings, plumbing, wiring, slaughtering, meat and provisions and milk.

10. The board of health. This board requires an office, and should have in any large community a small laboratory for biological and bacteriological analysis.

11. Cemetery commission.

12. School department, although this department

First Floor Plan — Second Floor Plan

Town Hall, Arlington, Mass.

is often provided for in one of the school buildings.

13. Fire department. The activities of this department are also frequently taken care of in one of the buildings belonging to it.

14. Police department and lockup. In large communities this department has its own building; otherwise a lockup is sufficient, and may be placed in the basement of the town hall.

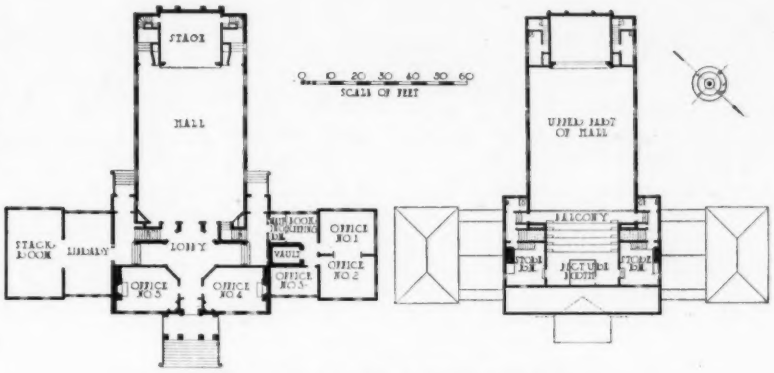
15. The park department.

16. The planning board. This board and members of the park department can meet in a committee room, as they need no separate quarters.

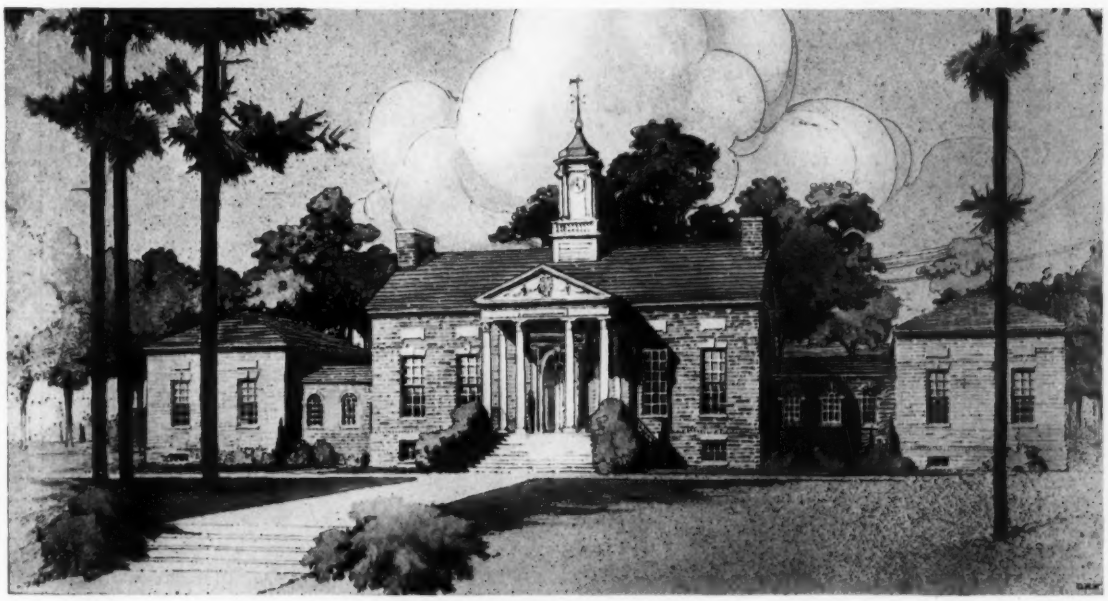
Added to all these departments, which are strictly administrative, are usually a number of facilities for social uses. Chief among these is a banquet or supper room with a kitchen and pantry. Often also a room is set apart to serve as a public library. This use may be temporary, pending the time when the library shall have grown so as to need a separate building. By that time the room in the town hall originally used for housing the library will be needed for some new town department.

The present standards controlling the design and construction of town halls are much higher than they used to be, and this has a very direct effect upon the character of the building. Up to 15 years ago the hall was usually on the second floor with the offices and smaller rooms underneath. Today such an arrangement would be regarded as quite unsatisfactory compared to the plan in which the hall is on the first floor. The increased number of voters in most towns makes it very important that the hall shall be provided with adequate exits near the ground. This fact affects the ground plan of the town hall fundamentally. Furthermore, a hall approached by a broad flight of steps and entered at the first floor level is much more dignified and impressive than one reached only by interior staircases. The hall cannot have offices built over it, as this is uneconomical; therefore the offices must be in the basement underneath the hall or in a wing or wings on the same level. In the plans shown of the Tewksbury and Dover Town Halls the wings are a single story in height. In the Arlington Town Hall the plan is similar in arrangement but the wings are two stories high.

The requirements of the smaller towns at the



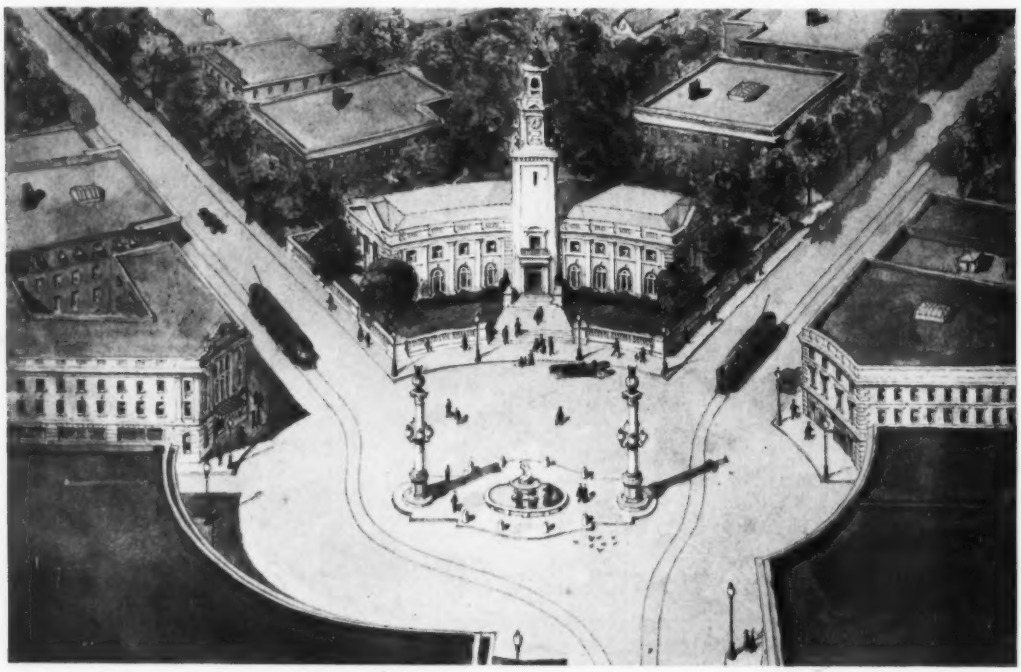
First and Second Floor Plans, Dover Town Hall



Sketch for Town Hall at Dover, Mass.
Kilham, Hopkins & Greeley, Architects

Proposed Memorial City Hall for Attleboro, Mass.
Kilham, Hopkins & Greeley, Architects

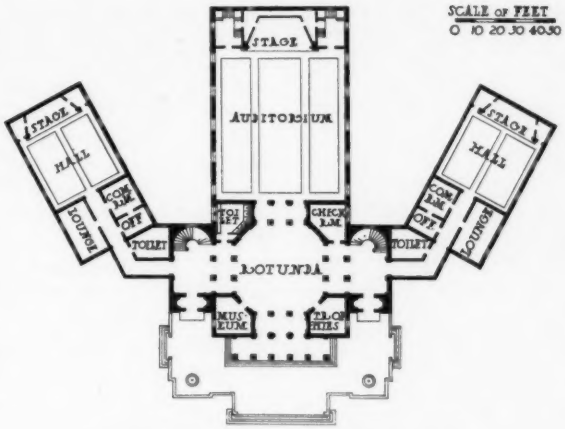
present time are shown in both the Tewksbury and Dover plans, which may be regarded as typical as far as the accommodation which they provide is concerned. They contain halls with stages and galleries, general offices with two private offices each, one for the selectmen and similar boards and committees and the other for the assessors and officials dealing with finances. Each has also a room for use as a public library, one or more committee rooms, a banquet hall and a kitchen, together with such minor items as a small room for the sealer of weights and measures, a lockup and storage space. This provides for a community of 2,000 or 3,000 population. The Arlington Town Hall serves a community of 15,000 to 20,000. When the population exceeds this latter figure the limited or



Scheme for a Town Square at Framingham, Mass.
Charles M. Baker, Architect

representative form of government becomes necessary, and the capacity of the hall need not, therefore, be increased. So much for the practical side of the town hall.

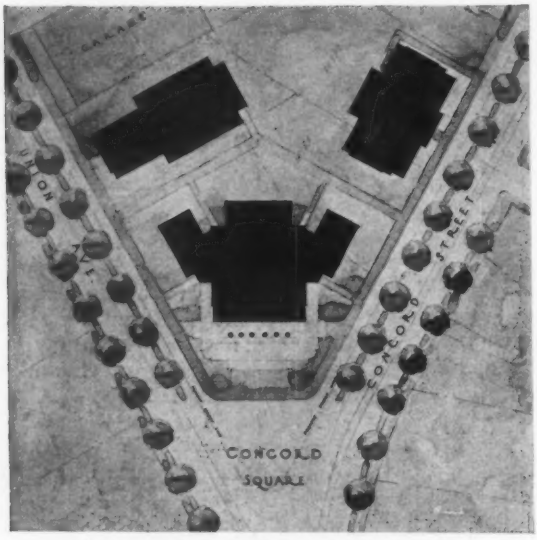
Much has been said as to the desirability and propriety of making such a building a memorial to the men who participated in the great war. It has been argued that such a memorial may combine beauty with utility, and that it is usually of a size that will add appreciably to the character of the village center where it may be built. All this is true. Architecture is one of the fine arts, and if the memorial hall is good architecturally the memorial is highly successful and is a credit and honor to those whom it commemorates. Of course it may not be of good architecture, but the same risk exists in the field of sculpture or painting. A monument may not be monumental or even tolerable in appearance. The commemorative painting may be very fine or very disappointing. A work of art which is not successful is a very great burden for any community to carry. Nevertheless, it is through some form of art that we must seek to express our ideals and emotions, and when a town decides to erect a memorial the important task is to choose the best artist available for the type of memorial desired, whether it be sculpture, painting or architecture. The easiest mistake, especially for a well-to-do American community, is to build the memorial too large at the sacrifice of scale and material. The building should dominate but not overpower its surroundings, and it should be of permanent construction and of the handsomest materials available. A small building of granite may be a very much nobler memorial than a large building of humbler material.



Main Floor Plan for Proposed Memorial Building
Framingham, Mass.

The material most common in New England for use in public buildings is common red brick trimmed with white marble or other stone. This is adapted to buildings in the colonial and Georgian styles and is usually in harmony with the surroundings that the building is likely to have in a New England village. In the larger towns and cities buff limestone, freestone or even marble is frequently used. The Arlington Town Hall is entirely of Indiana limestone, while the public library nearby is in Ohio freestone. The two materials appear very well together. Another stone frequently used, particularly suited to the New England climate, is granite. This stone lends itself not only to the colonial treatment but to the Greek, Roman or renaissance architectural styles. University Hall, by Bulfinch, in the Harvard yard is an example of the beautiful use of granite in a small scaled colonial facade. Another building by this early New England architect, the Massachusetts General Hospital in Boston, shows granite treated in a

Perspective of Proposed Memorial Building at Framingham, Mass.
Charles M. Baker, Architect



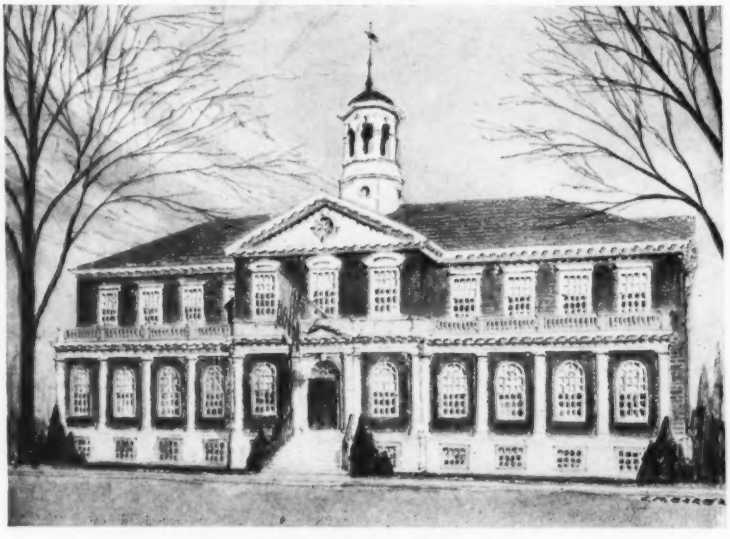
Alternative Scheme for Square, Framingham, Mass.
Charles M. Baker, Architect

different style bordering on the impressiveness of the Roman, but with excellent results. The early use of granite was generally restricted to styles in which ornament was not essential. In some cases carved ornament was supplied by marble panels, for example. Enlarged facilities today, however, make carving in granite comparatively as simple as in the softer stones.

The memorial character is secured by the qualities already enumerated. Beauty alone will not make the building a memorial. Bad scale will mar it. Cheap or temporary materials will ruin it. Impropriety of design will spoil it. A memorial town hall designed like an ordinary office building is lacking in memorial quality. On the other hand it is just as bad to have it look like a state capitol.

In the usual town hall display must be avoided and every effort made to preserve a dignified simplicity. Tradition should dictate the style used, particularly in a locality which possesses noble traditions, for in commemorating its heroes who went out from the town the community will want to build a monument which reflects their characters, homes and haunts. Old Deerfield, Massachusetts, is steeped in the traditions of the Indians and early settlers. The style of its memorial should be in harmony with such a tradition; Ashtabula and Gary should build in a different style, St. Augustine in another, San Diego in still another, and New Orleans in a style wholly different. Arlington, Massachusetts, is a town with some revolutionary traditions, but now a large and thriving residential suburb of Boston. The style of its town hall well expresses this particular community. The Dover and Tewksbury Town Halls are located in remoter suburbs, having the character of small, open villages, with farms and country residences. Both towns have only general colonial traditions. The Attleboro City Hall is again different in style. Attleboro is a small city, almost entirely devoted to the manufacture of jewelry. The city hall is very delicate in its detail, and is of fine material, either white marble or light colored stone, richly carved. The proposed memorial at Framingham is monumental in scheme, but in its modest materials entirely fitting.

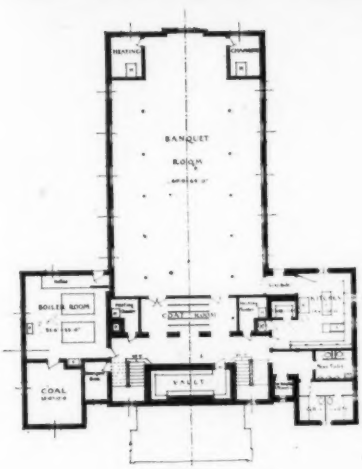
The town hall is generally among the more important buildings of a place; quite often it is the most important structure in the town, and it is necessary that it be given a dignity which shall make it in keeping. Such a building is rarely without surrounding grounds of some extent, and this adds to the importance of its treatment since it becomes practically a civic center. Moreover, a town hall is expected to be a structure permanent and lasting, built to function as long as the town itself endures, which, particularly where it is developed as a memorial, should stir the architect to the exertion of his utmost efforts in the matter of design, plan and the wisest choice of materials. Properly designed, the town hall will prove a lasting testimonial to the skill of its architect; no less so, perhaps, than a memorial to those whose sacrifices are commemorated therein. With due consideration in each individual case of these factors of propriety, scale and style, a large percentage of the memorial town and city halls that will inevitably be built may be worthy of their communities.



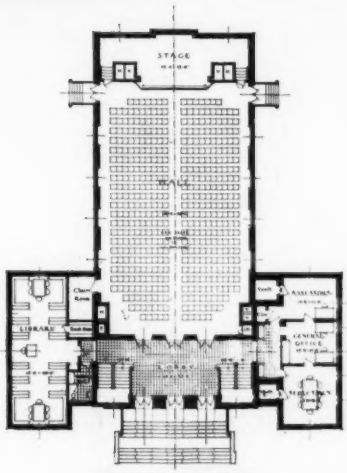
Proposed Town Hall, Framingham, Mass.
Charles M. Baker, Architect

DETAIL VIEW FROM APPROACH, TOWN HALL, TEWKSBURY, MASS.

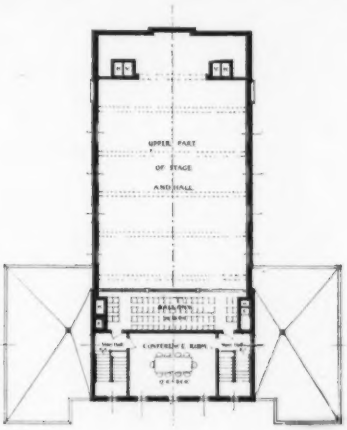
KILHAM, HOPKINS & GREELEY, ARCHITECTS



BASEMENT PLAN



FIRST FLOOR PLAN



SECOND FLOOR PLAN

TOWN HALL, TEWKSBURY, MASS.

KILHAM, HOPKINS & GREELEY, ARCHITECTS

ENTRANCE LOBBY LOOKING TOWARDS OFFICES

ASSEMBLY HALL

TOWN HALL, TEWKSBURY, MASS.

KILHAM, HOPKINS & GREELEY, ARCHITECTS

TOWN HOUSE, PETERBOROUGH, N. H.

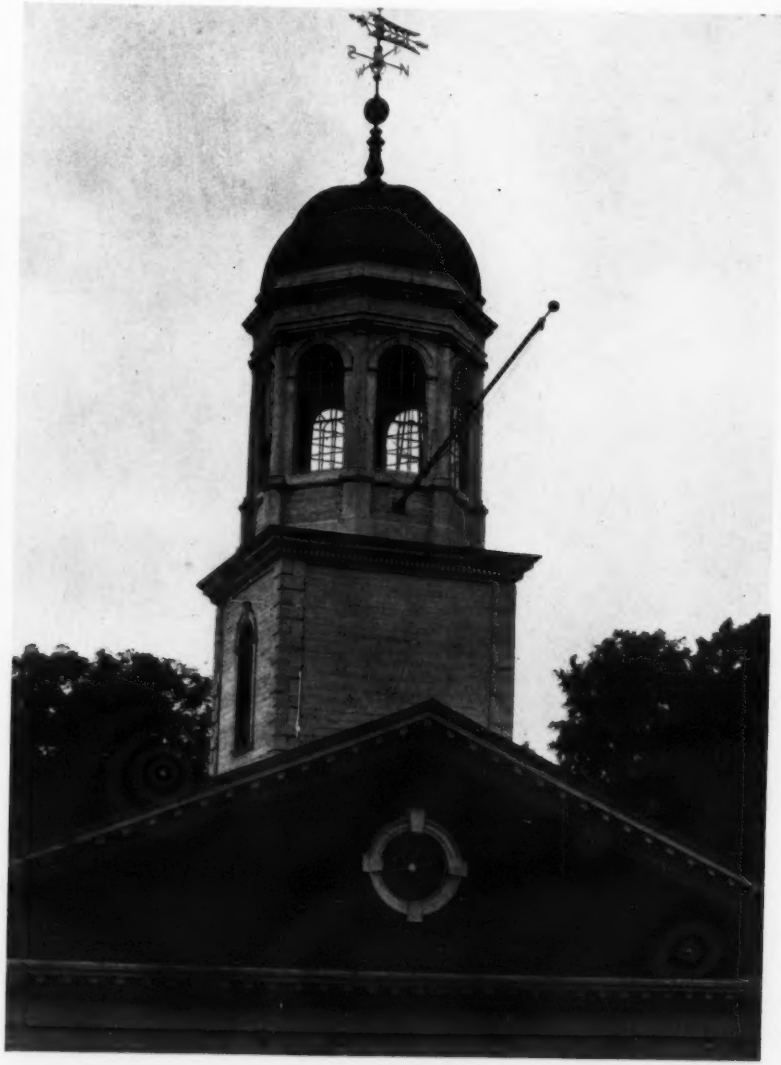
LITTLE & RUSSELL, ARCHITECTS

DETAILS OF FRONT AND SIDE FACADES

TOWN HOUSE, PETERBOROUGH, N. H.

LITTLE & RUSSELL, ARCHITECTS

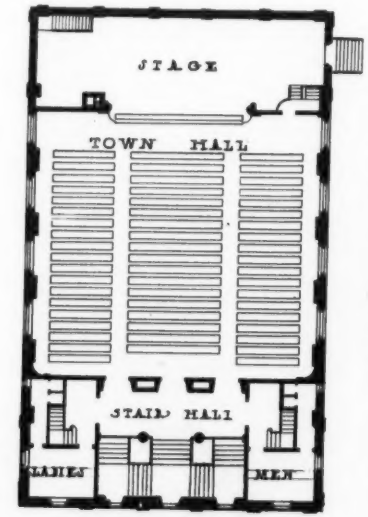
DETAIL OF STAIR HALL



DETAIL OF LANTERN

TOWN HOUSE, PETERBOROUGH, N. H.

LITTLE & RUSSELL, ARCHITECTS



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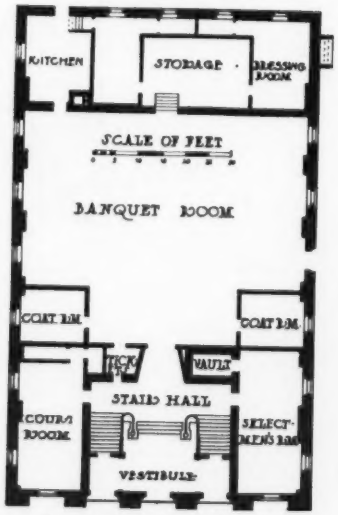
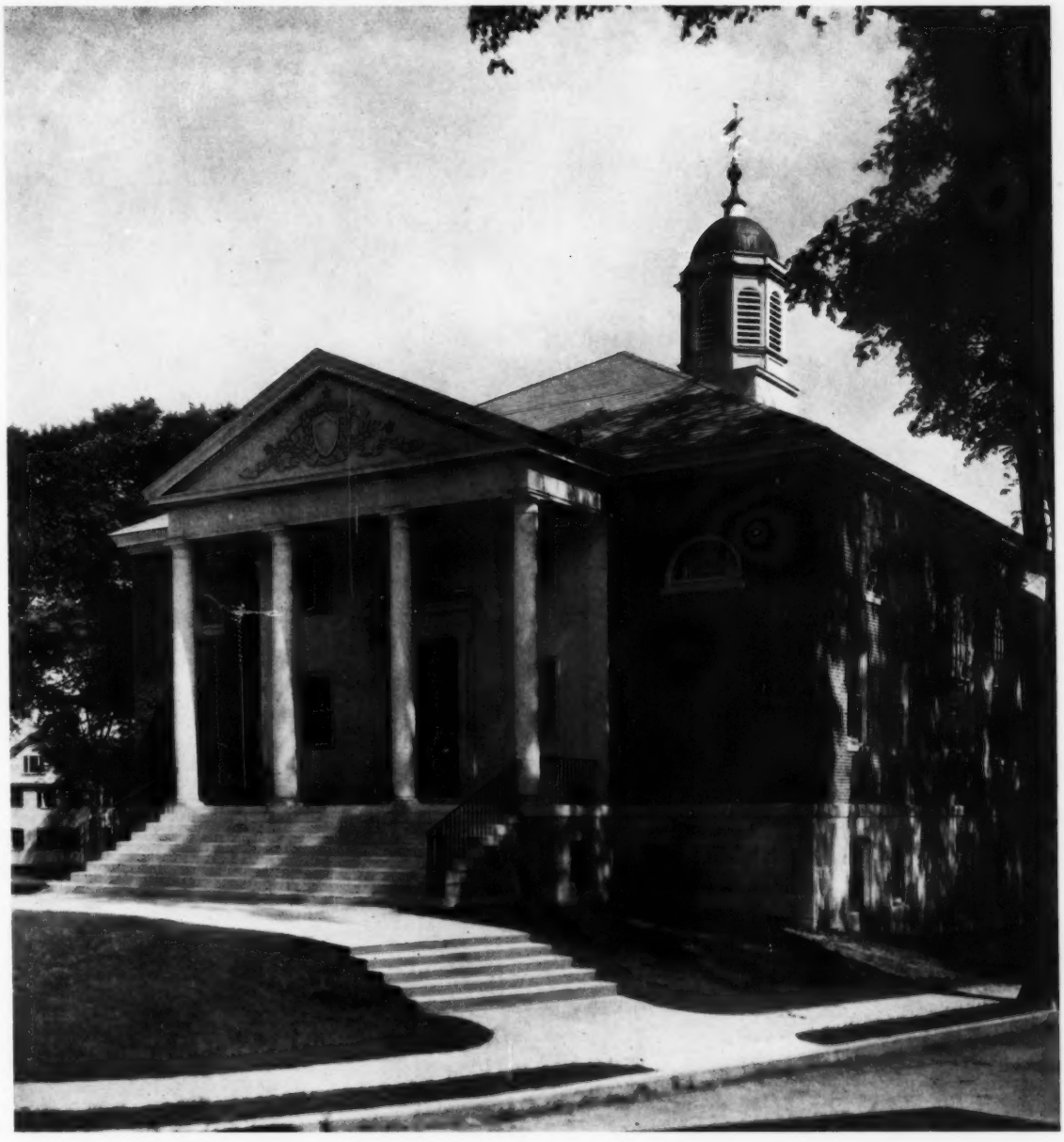


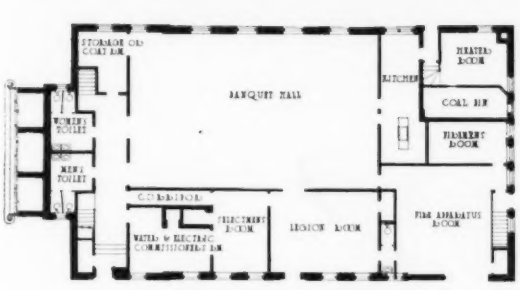
FIRST FLOOR PLAN

ASSEMBLY HALL

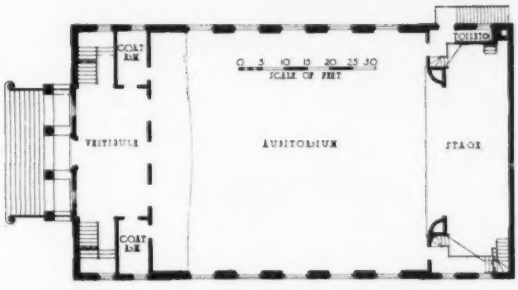
TOWN HOUSE, PETERBOROUGH, N. H.

LITTLE & RUSSELL, ARCHITECTS





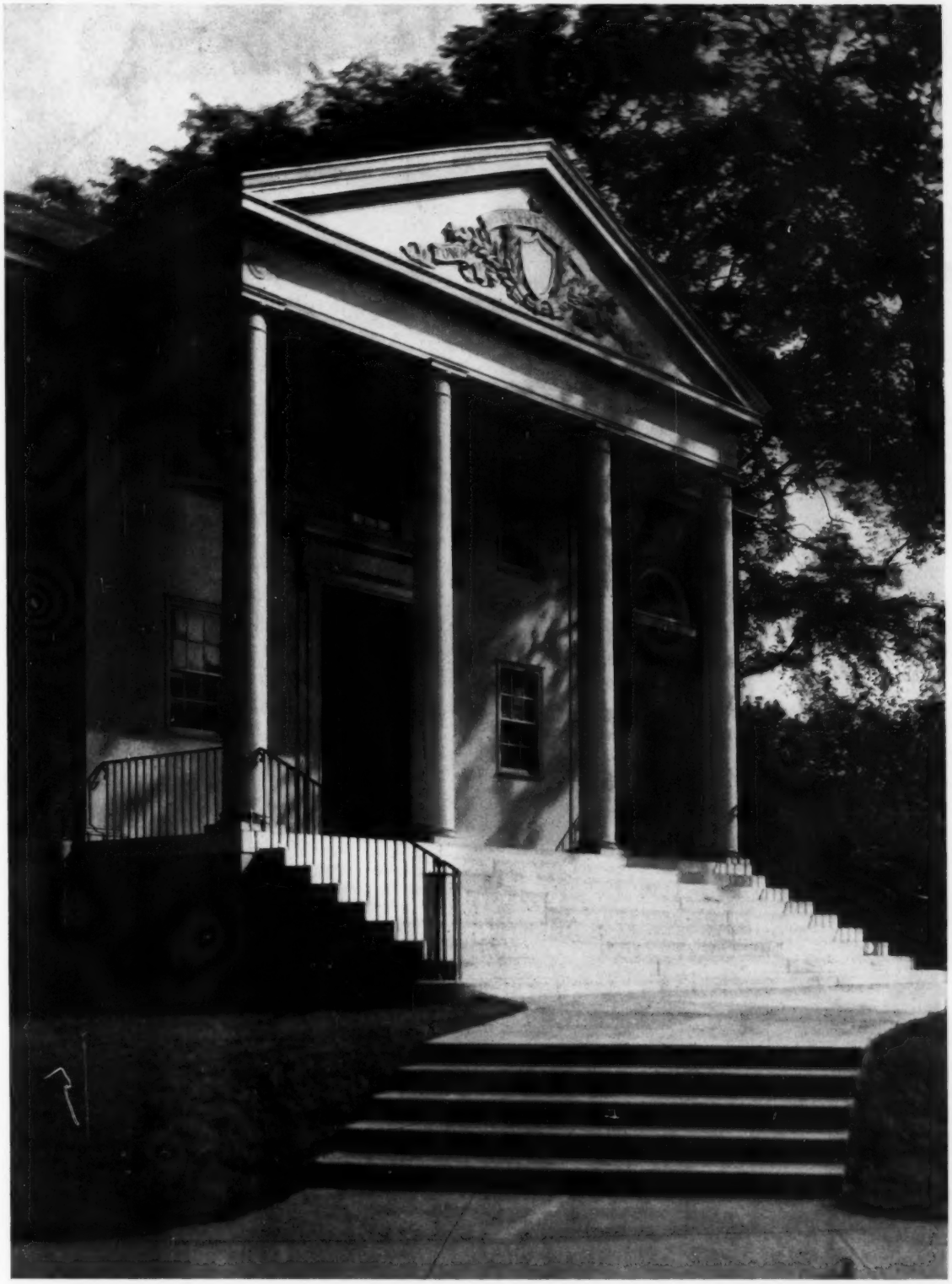
BASEMENT FLOOR PLAN



FIRST FLOOR PLAN

TOWN HALL, KENNEBUNK, MAINE

J. D. LELAND & COMPANY, ARCHITECTS



DETAIL OF ENTRANCE PORTICO

TOWN HALL, KENNEBUNK, MAINE

J. D. LELAND & COMPANY, ARCHITECTS

Villas of the Veneto

By HAROLD DONALDSON EBERLEIN AND ROBERT B. C. M. CARRERE

VI. MALCONTENTA (VILLA FOSCARI), NEAR GAMBARARE, CANALE DI BRENTA

"NOT very far from the *Gambarare*, on the *Brenta*, is the following fabrics, belonging to the magnificent Signors Nicolo' and Luigi de Foscari. This fabric is raised eleven foot from the ground; and underneath are the kitchens, servants' halls, and such like places, and vaulted rooms above as well as below. The height of the vaults of the greater rooms is according to the first manner for the height of vaults. (Book I, Chapters 23 and 24.) The square rooms have their vaults *a cupola*. Over the small rooms there are *mezzati*. The vault of the hall is crossed semicircularly; the height of its impost is as high as the hall is broad; which has been adorned with most excellent paintings, by Messer Battista Venetiano. Messer Battista Franco, a very great designer of our times, had begun to paint one of the great rooms; but being overtaken by death, has left the work imperfect. The loggia is one of the Ionic order. The cornice goes round the house, and forms a frontispiece over the loggia; and on the opposite part below the main roof there is another cornice, which passes over the frontispiece. The rooms above are like *mezzati*, by reason of their lowness."

View of Principal Front from Distance

THUS have we Palladio's own description of Malcontenta, published in his *Quattro Libri dell' Architettura* in 1570. It is not necessary at this point to enter into a detailed story of Malcontenta, which, by the way, is full of interest if one chooses to pursue it. A bare outline, along with some comment on the vicissitudes through which it has passed, its present condition, and the nature of the site, will serve our purposes for the time being.

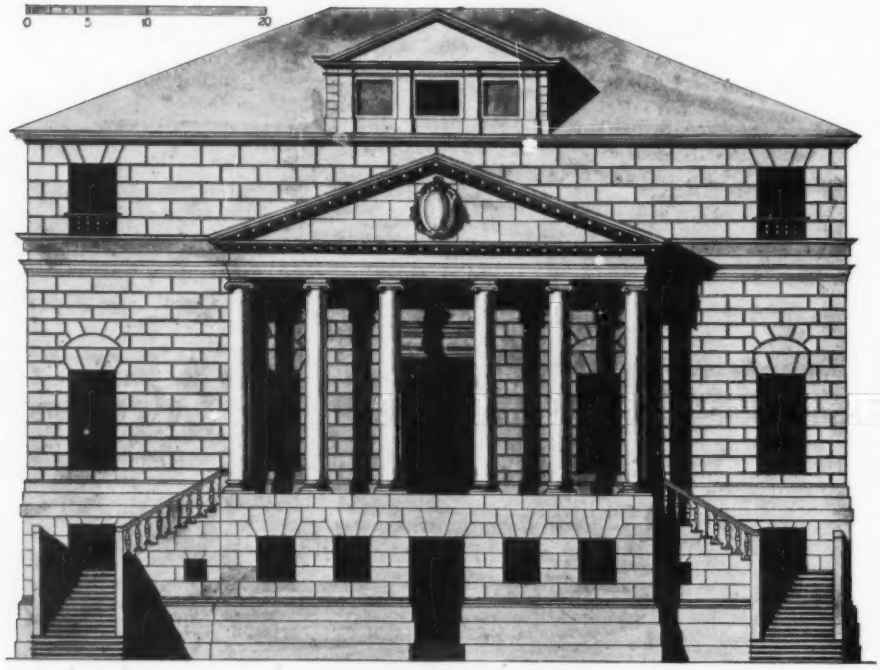
The exact year in which the villa was built seems to be shrouded in some uncertainty. At any rate there is ample evidence to show that it was erected at an early date. Tommaso Temanza, in his eighteenth century biography of Palladio, says that because of "this beautiful invention of his" at Malcontenta "Andrea's name began to resound also in Venice," and that the fame thus noised about brought him thé important commissions he subsequently executed within the city itself. His statement apparently is not lacking in accuracy.[1] Geographically, Malcontenta is the first outpost—chronologically it is one of the earliest, if not indeed the very earliest—in that long chain of villas with which the Venetian nobles in close succeeding years lined the banks of the Canale di Brenta, an expansion of Venetian life already reviewed in previous papers, which reached the culmination of its splendors in the Palazzo Pisani at Strà in the eighteenth century.[2]

The name "Malcontenta," so the legend has it, was bestowed in allusion to a "fair but frail lady of the family, who was sentenced by her kinsfolk to do penance there." Happier memories are those of the sumptuous festivals of which this villa was the scene. One of the most famous of these was in 1574, when the Foscari entertained King Henry III of France. After a magnificent luncheon at Malcontenta, the sovereign took boat, the proper mode of progress on the Brenta, and passed up the stream "in amazement at its splendid villas, amongst which the house of the Procurator Federigo Contarini particularly caught the royal regard." We may well believe that the Foscari, in whose palazzo in Venice the distinguished guest of the republic had been domiciled, would not allow the magnificence of his entertainment in their country house to fall short by comparison, and even now, after more than three centuries, we seem still to catch the distant glint of all this brave parade, from the inventory of fitments provided against Henry's visit, when we read among the items for the king's gondolas: "felse[3] of scarlet satin, 156 ducats; a boat's carpet of violet Alexandria velvet; a felse of the same velvet lined with silk, 55 ducats; another velvet carpet of the same color, two canopies, one of violet satin fringed and embroidered with gold, the other of white satin, and two cushions of scarlet satin and gold." The mind's eye is dazzled till it fairly aches on reading the rest of the inventory of gorgeous appointments which the state provided to adorn Henry's lodgings in Venice, every item duly accounted by measure and cost. Whatever gala decorations the Foscari themselves may have devised to mark the king's

[1] The four important commissions referred to in Venice were the Conventa della Carita, the facade of San Francesco della Vigna, San Giorgio Maggiore and Il Redentore.

[2] Now known generally as the Villa Reale.

[3] The canopied or cabin-like covering over the rear seats of a gondola.

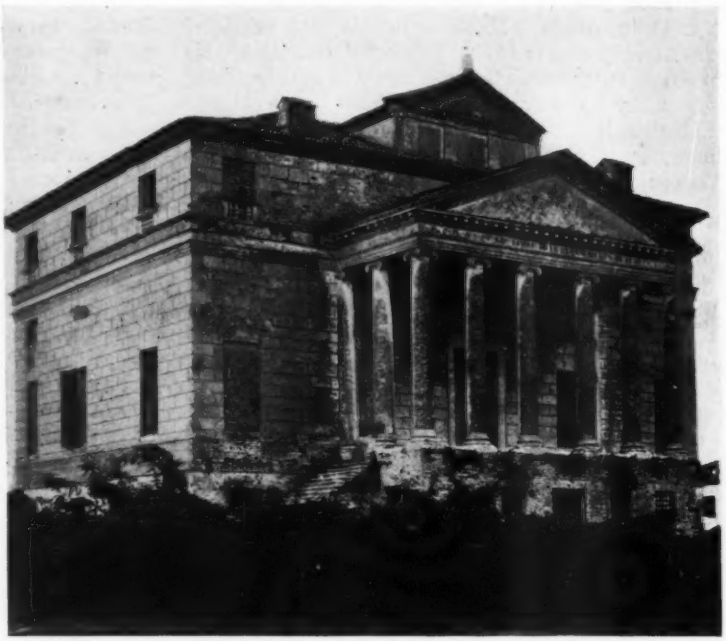


Elevation of Principal Facade

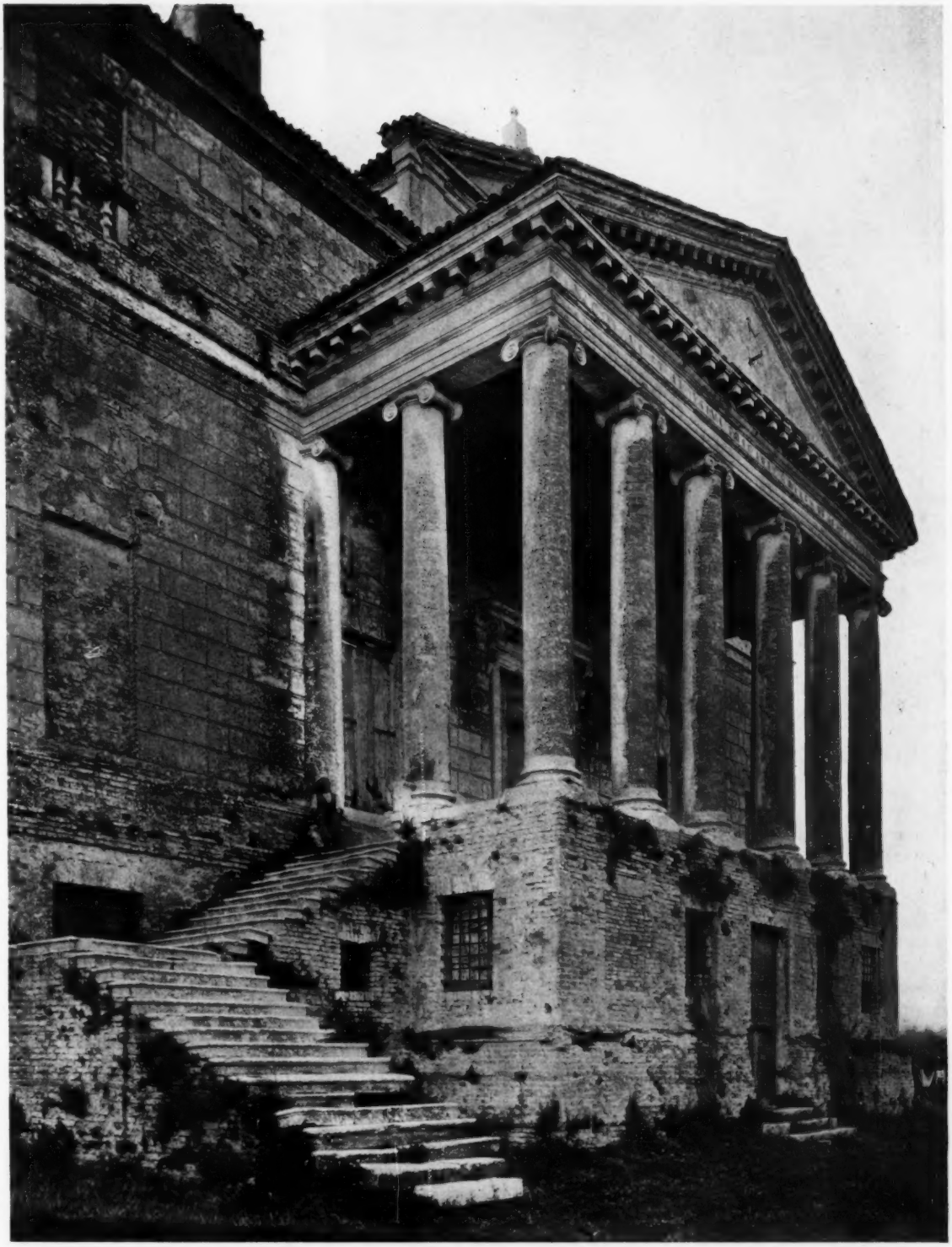
visit to Malcontenta, there is no doubt that the villa itself afforded a worthy and regal setting for all the incident wealth of color.

The present state of the house and its immediate surroundings quite justify the melancholy name of the villa, as one may easily see from the illustrations. The gaunt, half ruinous pile is but a sorry ghost of its former self—one flight of steps leading up to the loggia quite gone, the other flight broken and bereft of its balustrade; the basement used as a storage place for farm implements and vehicles; the great cruciform *sala* of the main floor, and some of the smaller rooms likewise, doing service as granaries with all the floors piled high with heaps of corn, as the pictures show; the great chambers filled with lumber of all sorts; the windows either boarded up or unglazed, with the appearance of the sockets of sightless eyes; and over all a general air of depressing desolation. And yet, despite the mournful aspect of decay, the fabric retains an air of indomitable nobility so convincing that one is profoundly impressed with its inherent greatness. Fortunately, the structure is so substantial that the apparently advanced stage of dilapidation is in reality scarcely more than superficial, and it is gratifying to know that its present possessor, the Count Minerbi, has already taken steps for its restoration.

The site in itself could never have offered much attraction save that of its proximity to Venice, its position on the Canale di Brenta, and ease of access by barge or gondola. The country in all directions is as flat as a table, and there are but few trees to break the barren monotony, while on all sides are the fens intersected by canals. Altogether subordinated for years to farming interests and the dictates of purely utilitarian expediency, the natural nakedness of the environment is all too plainly revealed in the recent photographic records. It is kinder and fairer to judge of Malcontenta's possibilities of beauty, through the aid



Present-day View of North Front of Malcontenta



DETAIL OF NORTH FRONT AND PORTICO

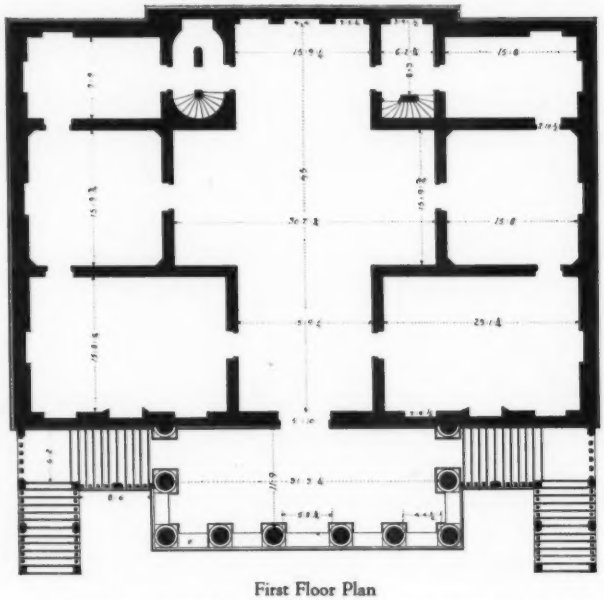
MALCONTENTA, NEAR GAMBARARE, CANALE DI BRENTA

Detail of Loggia Entrance

of artificial means, by examining the reproductions from the eighteenth century prints of Coronelli and Costa (shown here through the courtesy of the librarian of the Biblioteca Marciana) which, notwithstanding some of their quaint, strained perspectives, convey a reasonably accurate idea of the appearance once presented by the villa with its accompaniment of subsidiary structures—the retaining wall along the canal, graced by urns; the water steps; the arcaded garden enclosure to the south; the chapel and other adjacent buildings; to the east, beyond the bend in the stream, the spacious *piazza* enclosed on three sides by loggias, a *piazza* which the Venetians used to compare with that of St. Mark's; and, not least of all, the engaging evidences of canal life and customary modes of transportation.

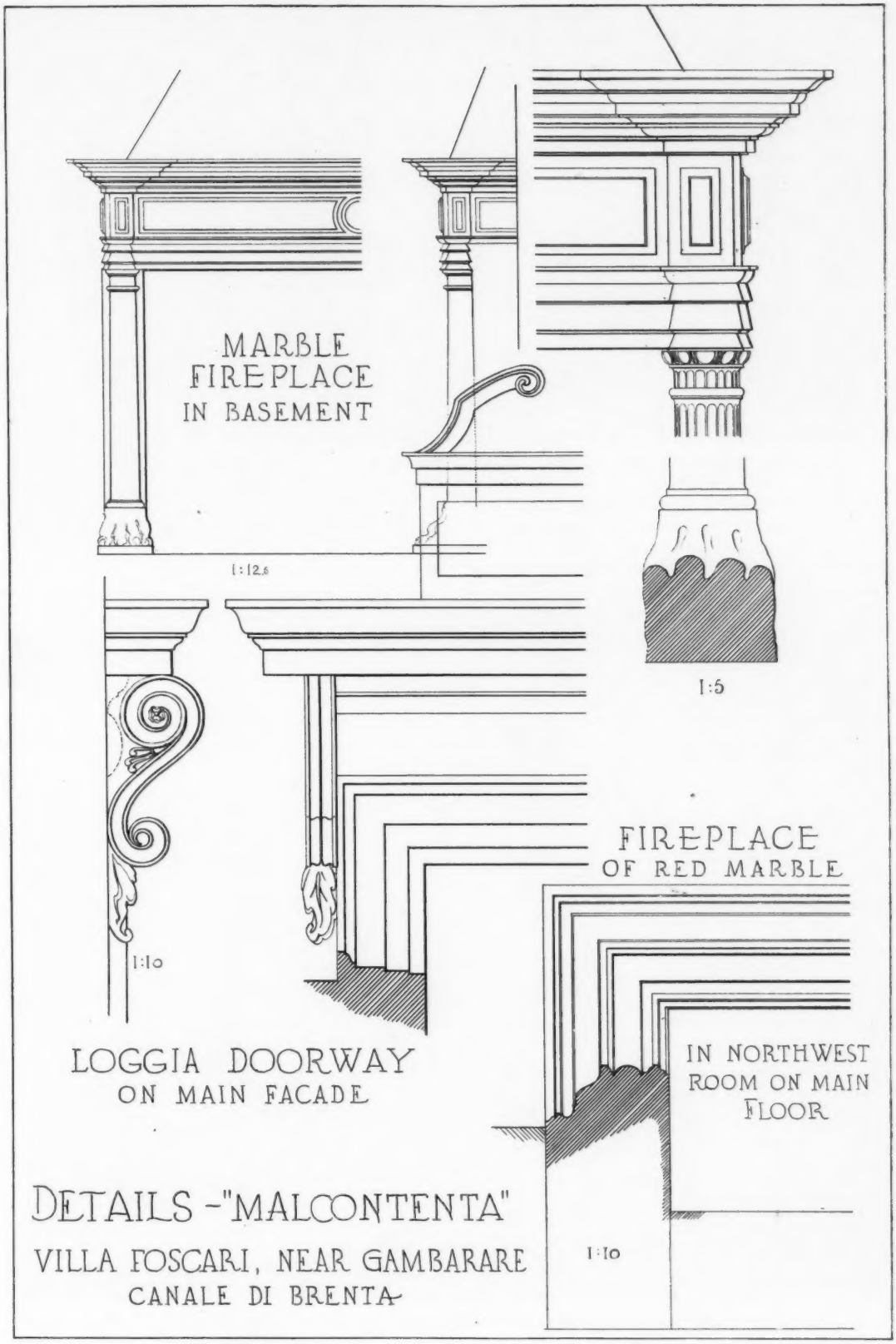
Malcontenta is built of brick and coated with stucco. Projections for all mouldings and cornices are roughly formed, first of advanced brick courses of the necessary proportions, and then finished smoothly with stucco. The steps to the loggia are of marble; the balustrades, the plinths and bases of the columns, and the sills of the windows are of white Istrian stone such as one sees everywhere in Venice. The shafts of the columns are composed of shaped bricks and then coated with stucco, while the capitals are of terra cotta painted or stucco-washed. Over the entire building the stucco was finished with an exceedingly well executed *marmorino* surface, so that in many places—especially the south or garden front—much of the original cream color still remains. Elsewhere, under the action of sea air, weather and the growth of minute lichens, the walls have assumed a silver gray and thus approximate the appearance of old stone.

In the great cruciform *sala* of the principal floor are yet visible considerable portions of once brilliant frescoes, and doubtless more will be revealed by the careful removal of sundry coats of whitewash. In the large front chambers on the north side of the house, which contain vigorously designed red marble chimneypieces, one of which is illustrated, the frescoes and the "painted architecture" have fared



First Floor Plan

Measurements in Vicentine feet; increase one-seventh for equivalent in English feet



LOGGIA DOORWAY
ON MAIN FACADE

DETAILS - "MALCONTENTA"

VILLA FOSCARI, NEAR GAMBARARE
CANALE DI BRENTA

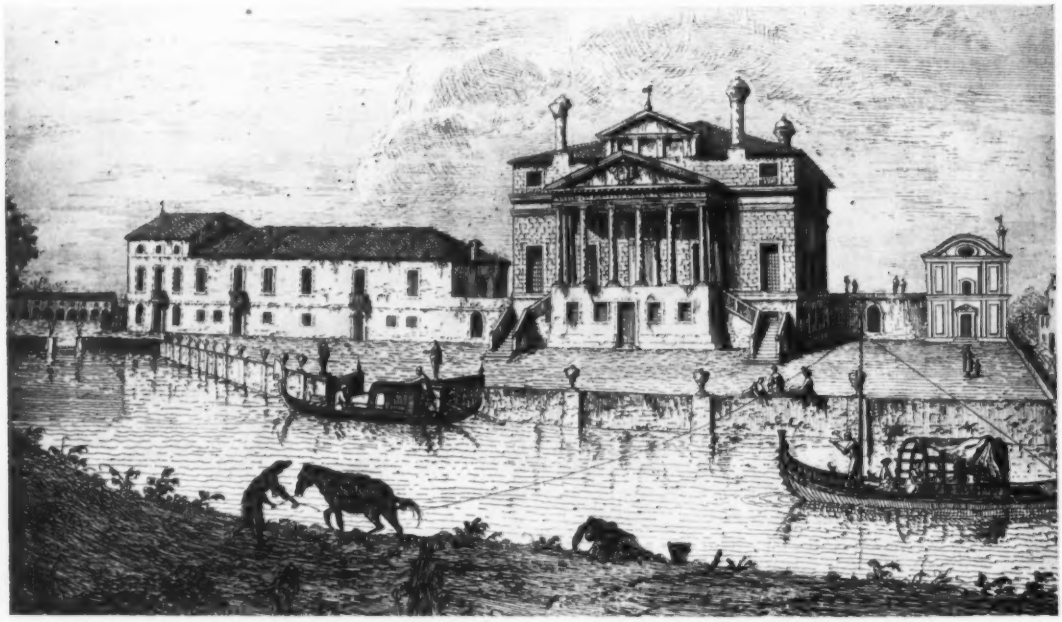
An Early Engraving Showing Malcontenta from Canal Approach

badly through neglect and ill usage, and are very dim. However, in some of the smaller rooms, the Arabesque decorations reminiscent of Giulio Romano's manner, the "painted architecture," and the landscapes in the lunettes of the ceiling are still fresh and clear. The chimneypiece with fluted pillars, now in the basement but obviously removed thither from one of the upper rooms, is of white marble but has been successfully disguised under a thick coat of gray paint.

Messer Battista Venetiano, already mentioned by Palladio as one of the painters who helped to adorn the walls of Malcontenta, we have met before as a fellow worker with Paolo Veronese in the Villa Emo at Fanzolo; we have also seen that he was sometimes known as Battista Zelotti, but more correctly as Giovanni Battista Farinati. Some of the frescoes at Malcontenta have been ascribed in the past to Paolo Veronese. Here and there are fragments of full-blooded design that might well have come from his brush, but the meager remnants visible at the present time seem scarcely sufficient to establish provenance. Whether the attribution be correct or not, there is nothing inherently improbable in the supposition that Veronese, then rising to the height of his fame in Venice, may have been called in to complete the work cut short by Battista Franco's death in 1561.[1]

We know Veronese's association with both Farinati and Palladio, and nothing seems more natural than that the two painters should have worked together to glorify the interior of Malcontenta, as they worked together in other villas of Palladio's. At all

[1] Battista Franco died in 1561, not in 1580, the date frequently but incorrectly given. As Palladio's book was published in 1570, he could not have recorded the demise of a man who did not die till ten years later.



An Early Engraving Showing the Villa Malcontenta and Its Original Appendages

Marble Fireplace in Basement

Red Marble Fireplace Surround

events, the presence of glowing color on the walls of Malcontenta, Emo and Maser—to name only three of Palladio's villas fully adorned with frescoes, with the architect's full concurrence—should be quite enough to overturn the erroneous notion, apparently entertained in some quarters, that Palladio's creations were cold and lifeless things, devoid of human warmth and without any appeal to or consideration of the emotional side of man's nature.

As the plans disclose, Malcontenta consists of a single solid block without wings, and Palladio seems never to have incorporated in his layout any provision for the various dependencies. The *sala* of the grand floor, as the pivotal feature of the plan in the villas of the Veneto, has already been commented on elsewhere. It may be well to remind the reader that the *sala* is lighted not only by the three central south windows but also by the semicircular Roman window above them. The staircases are inconspicuous features and, being of purely utilitarian function, without architectural emphasis.

In his reference to Malcontenta, Mr. Fletcher observes that it is peculiarly "interesting as being the forerunner of many of the eighteenth century (or pediment and portico) houses in England." Quite apart from this consideration and the significance imputed to it as one of the earliest means of fixing the Venetians' attention upon Palladio's ability, Malcontenta makes a strong appeal in its own independent right as an exceptionally fine and satisfying composition. Allusion has been made in a previous paper to Pal-

Frescoes in Small South Room

ladio's fertile ingenuity in contriving widely divers compositions from a limited number of motifs. In this connection common justice and a sense of fair play bid us discount the strictures made by sundry writers upon what they are pleased to term Palladio's frigid, *jejune*, academic manner, the "specious, vapid purity" of his style, and his poverty of vital invention. Palladio chose to impose upon himself certain limits within which to exercise his powers of invention. He was doing in architecture what Palestrina and other contemporary polyphonic composers were doing in music. The marvelous beauty of their music was in no wise lessened by the strict contrapuntal forms the polyphonists followed; neither were Palladio's ingenuity and originality fettered by the canons he set himself.

View of South or Garden Front

Detail of Portico Columns, Villa Malcontenta

As M. Yriarte observes, "those rules were a bridle, a check, but the great artists of the day launched, notwithstanding, into signal elasticity of genius, into the most original combinations."

It is one irrefutable indication of Palladio's real genius, originality, and complete mastery of his art that he could always impart a striking individuality to each new subject and yet keep within the bounds —not slavishly but intelligently—of the precedents he had elected to follow. It might be well if some of the moderns, who are crying up a specious originality independent of all precedent, would learn a lesson out of Palladio's book.

Just as the great English architects of the eighteenth century drew from the work of Palladio the inspiration for their splendid houses in country or town, American architects of the twentieth are turning to the same source, and the half ruined remains of Italian villas such as Malcontenta afford a wealth of inspiration which by flowering anew will extend the Palladian tradition.

ENGINEERING DEPARTMENT

Charles A. Whittemore, *Associate Editor*

Central Vacuum Cleaning Systems

By E. J. SKILLMAN

A CENTRAL vacuum cleaning system, which is usually designated as the "stationary" type to differentiate it from the portable or movable type of cleaner, is given very careful consideration by architects and engineers in planning all types of buildings from the small residence to the larger commercial building. Vacuum cleaning has passed through the same stages of development as the automobile and cannot longer be considered as experimental.

It is obvious that many advantages are possessed by a central system for cleaning in which all the dirt from the building is conducted to a central point in the basement, and the air itself, which after being mixed with the dirt becomes very foul, is exhausted into the flue and out of the building. These advantages belong to the central system, when properly installed, rather than to the portable type vacuum cleaner. There are places where the small portable cleaners have their use, but in this discussion we wish to consider only the complete installation.

During the development period of vacuum cleaning the manufacturers made various claims for their apparatus,—some urging high vacuum and low volume, others medium vacuum and volume, and others low vacuum and high volume. It has been finally determined that the proper method of measuring the cleaning value of any machine is to have a definite vacuum at the end of hose lines, where the cleaning is being done under cleaning conditions. When cleaning carpets a high vacuum and a small volume are necessary, and when cleaning bare floors a lesser vacuum and greater volume are necessary. Properly designed vacuum cleaning systems will today produce the right proportion of vacuum and volume at the end of the hose for both bare floor work and carpet work. This proportion remains uniform, not only for different kinds of cleaning but also for different distances from the machine, having the same efficiency on the top floor as on the ground floor.

For commercial cleaning, where the cost of labor must be considered, the vacuum cleaning system should be specified to meet this capacity test:

"This system shall be subject to what is known as the orifice test. The vacuum producer shall maintain a substantially constant vacuum under all working conditions and be capable of maintaining for each sweeper at the end of 50 feet of hose, not over 1½ inches diameter, attached to any inlet valve in the building, a vacuum of not less than 2 inches of mercury while a round, sharp-edged orifice ⅞ inch in diameter is wide open, and a vacuum of not less than 3 inches of mercury while a round, sharp-edged orifice ⅝ inch in diameter is wide open. To determine whether the apparatus meets these specifications one outlet for each sweeper, which the apparatus is to operate simultaneously, shall be selected by the engineer making the test. To each of these outlets shall be attached 50 feet of hose the size used with the system. In each of these lengths of hose, excepting one, shall be placed a plate ⅛ inch thick with a ⅞-inch round, sharp-edged orifice through it. In the end of the hose where the test is to be made shall be placed a hollow metal globe, substantially 4 inches inside diameter, to the top of which shall be attached a vacuum gauge and in the side of which shall be a ⅞-inch round, sharp orifice. The vacuum gauge under these conditions should show not less than 2 inches of mercury. A similar test shall be made, using a ⅝-inch orifice instead of ⅞-inch, under which condition the vacuum gauge must not show less than 3 inches of mercury."

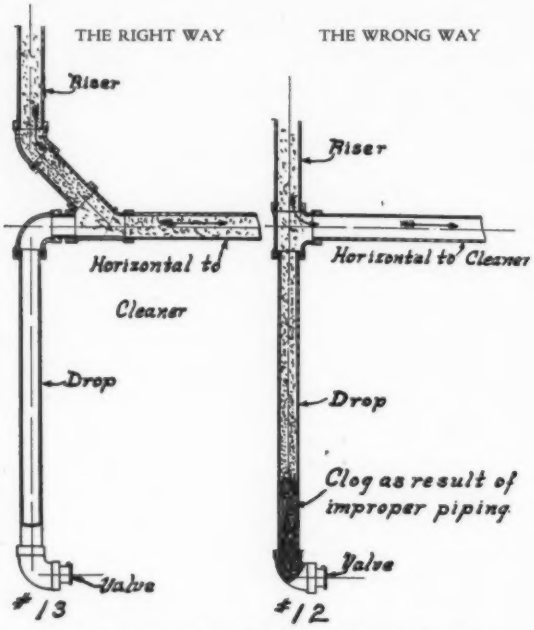
Any machine meeting this capacity test will give for each sweeper specified a cleaning efficiency at the tool end which will make possible the quick and thorough cleaning of not only carpets and rugs but bare floor surfaces whether of wood, terrazzo, marble or linoleum.

There are but three types of vacuum cleaners being manufactured today,—the multi-stage turbine type, the single-stage turbine type, and the double-impeller pump type. It is important that the installation of a vacuum cleaning system be given consideration at the time the plans are being drawn so that the piping may be properly laid out in conjunction with the heating, plumbing and ventilating, and that the benefit of competitive bidding on the piping may be had. The cleaning plant itself, with the hose, tools and inlet valves, can be included in the plumbing contract or purchased by the owner or general contractor as may be more convenient.

The piping system is quite as important as the selection of the machine. This piping should be planned so that any part of the building may be reached from the various inlets, using not over 50-foot lengths of hose. While it is possible to use

75 feet or even 100 feet of hose and still obtain comparatively good cleaning results, it should be remembered that the hose will wear out and the pipe will not, and that the labor cost is much greater when long lengths of hose are used. The proper kind of piping for vacuum cleaning is either black iron or mild steel, and all fittings are to be of the long turn, recessed drainage type. All pipe should be reamed to the full inside diameter, and all fins or projections removed and screwed "home" full against the shoulder of the fitting so as to leave a smooth, uniform bore.

These illustrations show the right and wrong methods of installing fittings for vacuum cleaning work.



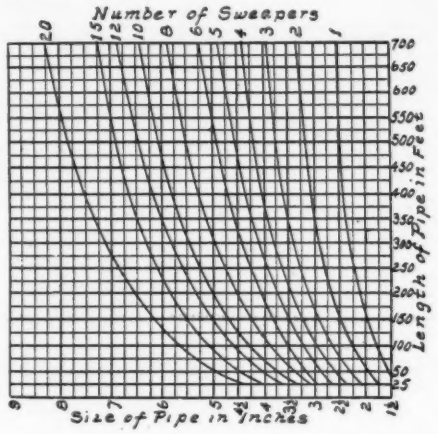
Showing Pocket Avoided by Use of Proper Pipe and Fittings at Left

Always Place Y-branches So They Will Turn in the Direction of Flow

The piping should not be so small as to require too high vacuum, high velocity and low density with the accompanying reduction in carrying capacity and increase in "sand blast" wear, nor, on the other hand, so large as to reduce the velocity sufficiently to permit settling. For commercial cleaning no rising line should be of less than 2½ inches, to avoid the possibility of stoppage from matches, toothpicks, hairpins, etc.

To determine the proper size piping for a vacuum cleaning system of one-sweeper and up to 20-sweeper capacity, the curves shown in the illustration included here should be used.

The diameter of pipe for vacuum cleaner systems may be determined by following the curves showing the number of sweepers to the intersection of the horizontal line giving the length of feet from the vacuum producer at the right. Directly below this intersection in a vertical line the size of pipe will be found. This applies to the actual number of sweepers likely to be in operation simultaneously on any branch of the system and not to the number of attaching points. Add 10 feet to the length of pipe in system for each 90° elbow.



An exhaust pipe should always be run from the machine to dispose of the foul air. This exhaust pipe should lead into the boiler flue or in the breaching surrounding it, or to any flue which has no opening above the basement.

The specifications should also call for the installation of a rubber sleeve or sound-breaker, to be placed next to the machine on both the intake and discharge lines. This is to prevent the transmission of sound and vibration. Inlet valves to which the hose is attached should be specified in finish to match the surrounding hardware and should be preferably of the spring closing type, and in school buildings should be called for in lock type. It is the usual practice to place these valves in the center of the baseboard, but where it is too narrow to permit of this being done they should be placed not over 10 inches from the floor which will prevent the hose breaking at this point.

Vacuum cleaning systems designed to meet the capacity test as called for can clean with each sweeper specified 3,000 square feet of carpeted surface per hour or 7,000 square feet of bare floor surface per hour. By taking the total square foot area of the building and figuring the approximate amounts of bare floor and carpeted space to be cleaned the number of sweepers necessary to clean any size building may be quickly determined, based of course on the number of hours during which the cleaning can be performed.

A recent treatise on vacuum cleaning claims that an ideal vacuum cleaning system would be one which when installed in any building will displace all appliances used for dry cleaning. A central cleaning system with a proper system of piping and capable of meeting the capacity test mentioned in this article will make this possible, and will not only greatly promote the sanitary conditions in the building but will do the cleaning with saving in the cost of labor as compared with the old methods.

Electrical Wiring Layouts for Schools

(CONTINUED)

By NELSON C. ROSS, *Associate Member, A.I.E.E.*

THE importance of each of a number of departments of a modern school building demands that considerable attention be given to its wiring specifications. The architect will find it necessary to plan carefully for the adequate and yet economical supplying of a department's present needs, with an eye also to its possible requirements a few years hence.

The Chemistry Laboratory. This department will require the same lighting, low tension clock and bell equipment as the physics laboratory, and to a certain extent the same table equipment, the lighting circuits feeding from the corridor panelboards and the tables and special apparatus feeding from circuits controlled from the local panel or switchboard in the room. The instructor's table should be equipped with receptacles connected on 110-volt alternating current, on 10-volt direct current, and in some cases 110-volt direct current is also used. All receptacles should be of the polarized type. The students' tables will require receptacles for 10-volt direct current, as it is seldom that voltage of other than 10 volts direct current will be required at the students' tables unless special work is to be done, and information regarding this can be obtained from the school authorities before the plans are completed. In some of the smaller schools it is customary to omit the use of table outlets for the students, the full equipment however being provided at the table of the instructor; when this is done, and when low voltage is required by the students, the current is provided by means of portable storage batteries.

Where wall tables or benches are employed, provision should be made for receptacles at these tables, so that small motor-driven grinding machines, testers, and a centrifuge may be used; the receptacles may be set in the wall at a point over the table, and as the machines used are of the portable type they may be connected with the circuit with the standard plug, such receptacles of course feeding from the alternating current service. If bakers are to be used in the laboratory, each outlet should be fed from a single circuit; the receptacle should be of not less than 30-ampere capacity, and the circuit should be of No. 8 wire. It is seldom that more than one receptacle of this capacity is required in the laboratory.

Provision must be made for the local ventilation of chemical hoods where the fume closet is installed; but one fan will be required, this set in the attic space or in the vent duct. "Ready to run" sets may be employed for this work, but in no case should the motor be installed in the duct or in the direct draft, as the acid fumes will quickly ruin the motor. The fan may be located in the duct, with the motor set on a shelf at a point outside the hood, the fan connected with the motor with an extended shaft. As these sets are of small capacity, the circuit may be taken from the lighting mains and from the nearest corridor panelboard, as a rule employing 220 volts and feeding the motor from the 220-volt buss bars on the panel. The motor may be controlled by means of one of the standard "heater combinations," consisting of a double-pole switch and pilot lamp mounted under one plate and at a point adjacent to the motor or vent hood; the pilot lamp or "bull's eye" will glow when the motor is in operation, thus tending to prevent the motor's being left running when not required. The controlling switch may be of the flush, key type so that the motor cannot be operated by the pupils, or a standard push-button switch may be used on the plate, and the line canceled when not in use, at the panelboard. The pilot may, if required, be independent of the switch plate and may consist of a flush socket set at a point near the ceiling of the room, so that a standard 25-watt red lamp may be used as a pilot.

Where the students' tables are individually vented, the several tables are fitted with hoods, all connecting with a metal duct which in turn passes either above the tables or down and under the floor and to a large vent fan either in the attic space or in a pent house on the roof. With this equipment a motor of from 1 to 2 horsepower will be required to operate the fan, and a remote-control type of push-button starter should be installed at the motor, the controlling push-button being carried back and installed at a point near the instructor's desk or on the controlling panel for the laboratory; a pilot lamp is of importance, as it indicates when the motor is in operation.

The General Science Laboratory. As employed in the smaller schools, the general science laboratory does not require elaborate wiring, since the work carried out is simple and can be cared for without the use of stationary wiring to the tables. One method that has been found to work well is to provide long benches or tables under the windows and along the walls, and to install a number of receptacle outlets over these tables, carrying the circuits either to the corridor panelboards or to a special panelboard as suggested for use in the physics and chemistry laboratories. These outlets are as a rule connected on the alternating current service at 110 volts, as direct current is seldom required for this work. These receptacles permit the use of small motors, testing machines, portable equipment and the charging of storage batteries, through proper rectifying apparatus.

A convenient method of supplying low voltage direct current for the students' tables is by means of a portable table carrying storage batteries; this table may be made up on casters or wheels and

should be approximately 24 inches square. The table is fitted with a lower shelf on which the batteries are mounted; the batteries may be of the automobile type or of the glass jar type, or again the Edison type of battery may be used. The top of the table is fitted with binding posts, and instruments are used on the table top and connected with the posts referred to. A cutout panel is mounted on one side of the table, this panel containing the circuit-breaker, charging instruments, switches and fuses, while either a chemical rectifier, motor generator charging set, or a rectifier of the tungar type is mounted on the battery shelf, the whole making a self-contained unit which may be plugged into any alternating current outlet for charging. When low voltage is required at the students' tables, the portable table is rolled into position, wires are led from the binding posts to the equipment under demonstration, and instrument readings taken from the table top.

The Library. The lighting of the library will depend primarily on the size of the room and upon the type and location of the furniture used; it may be by means of low ceiling illumination, balanced by individual lighting on tables, or wholly by means of ceiling fixtures. As a rule, however, for this work, from four to eight ceiling fixtures are employed, these outlets spaced to give general illumination throughout the room, at a value of from 6- to 8-foot candles, fixtures of the semi-direct type being used. Where it is desired to make use of table lamps, fewer ceiling fixtures are employed and these are of lower wattage, as general illumination is all that is required. The table fixtures may be portable and plugged into receptacles on the tables, or fixed table standards may be used, these employing green and white reflectors which keep the light at a point below the line of vision.

The circuits may be controlled from the corridor panelboard and mastered from a bank of switches located conveniently to the entering door. The conduits, where table fixtures are employed, run from the switch outlets down and in the floor construction to points under the tables, bulb tees being set in the floor construction with the tapped bushing level with the finished floor. The plugs are screwed into the bushings until the time that the tables are in place, at which time the plugs are removed and short pieces of conduit screwed into the bushings and terminating in outlet boxes on the under sides of the tables. The fixture stems pass through the table tops and all connections are made in the outlet boxes. If it is desired that no conduits show from the floor to the under side of the tables, the table legs may be drilled to a point near the table tops and the leg slipped over the conduit and connections made at points close to the table tops; when this is done an outlet box should be set in the table leg, or flexible armored conductor may be used from the floor outlet through the leg to the outlets.

Corridors and Stair Halls. With the exception of the main entrance, corridors and stair halls are as a rule lighted by means of direct ceiling fixtures of the ceiling collar type, these being spaced approximately from 20 to 22 feet on centers. These fixtures are fitted with some type of enclosed globe for use with 100-watt, Type C bulbs. All lights throughout the corridors, stair halls, toilets and elsewhere (where the students are likely to interfere with the switches) should be controlled by flush switches of the lock type, these set either singly or in banks. As keys are required for the operation of these switches, the lighting of the corridors, etc., cannot be interfered with by the students or by persons without keys.

It is further customary to control the lighting circuits of the corridors by means of three-way switch combinations, these located at each end of the corridor, the lighting fixtures to be connected alternately on the circuits so that half or the whole of the illumination of the corridor may be controlled from either end. Where corridors branch at right angles, a four-way switch is cut into the circuit, thus permitting four points from which the lighting may be controlled. The lighting outlets throughout the stair wells should be connected to feed from a single circuit, and as a rule from the first floor or basement panelboard, the circuit looping from the basement or first floor and connecting all of the outlets on the different landings. The circuit may be controlled by means of one lock switch, set at a convenient point on the first floor landing, or if desired three-way or four-way switch combinations may be used so that the whole lighting of the stair well may be controlled from any of the landings.

The outlets at the entering doors should in all cases be controlled by double-pole switches, and it is well to use no switch for the work of less than 10-ampere capacity; the outlets may be of the wall type for use with outside brackets or for the use of standards. Where the bracket fixtures are used for this work, conduit and the standard rubber-covered wires are all that are required; where, however, standards are used and are set at some distance from the building, the wire used should be lead-sheathed in addition to the rubber insulation. It is well to control all outside lighting on separate circuits from the nearest panelboard, the switches for this being on the panelboard, though if this location is not convenient lock switches may be cut into the circuit at some central point in the corridor.

Lighting of Grounds. Where the grounds are extensive and it is desired to use a number of lights, along the walks, at circles and at steps, etc., cast standards are usually employed, each fitted with one or a number of lamps. The wires are run underground from the building, connecting the standards on one or more circuits. While galvanized conduits and lead-sheathed wires may be used for the connection of the outside lighting, it is more convenient and less expensive to make use of steel-armored cables of the "park type." The conductors, being lead-sheathed and covered with steel tape (the tape in turn served with tarred jute), make the cable

proof against mechanical injury as well as waterproof. The cable is laid in one piece between outlets, all splices being made at the outlets, and as this cable is nearly as flexible as a piece of rope it can be installed where it would be impracticable to make use of rigid conduits.

The Gymnasium. The high school gymnasium, if of any size, should be wired as a unit and made independent of the other circuits of the building. It should be controlled from one or more panelboards and should have an independent feeder from the main switchboard.

It is becoming the practice to have the gymnasium divided into two halves, for use of the boys and girls, the room being divided either by means of folding doors or by a curtain; thus for school purposes the halves are used separately, while for exhibition purposes the doors are opened or the curtain raised and the room used as a whole. With this arrangement it becomes advisable to wire each half separately, each to be controlled from an individual panelboard; both boards, however, may be connected to the same riser or feeder. The locations of the panelboards should be convenient to the office of the instructor, and all circuits of the room should be controlled from switches on these panels; the panelboards should be of the "dead front type," using either push-button or toggle switches.

The lighting of the gymnasium must be from ceiling outlets, and these should be spaced to give even illumination over the floor. Where trusses are used the ceiling outlets will be spaced either between the trusses or on the lower side of the lower member, and the spacing will be determined by the positions of the trusses. If the trusses are approximately 20 feet above the floor the outlets may be placed on them; if lower than 20 feet, it may be well to space the outlets between the trusses and make use of a suspended type of fixture. In any event, the fixtures used should be of the guarded type, with a substantial wire guard to protect the lamp bulbs. A single Type C lamp of high wattage, set behind a guarded reflector, will give better results in gymnasium lighting than a fixture of the multiple type employing a number of smaller units.

Where the gymnasium is located under other rooms, or where the ceiling is low, the use of any pendant or exposed type of fixture is objectionable, as it is likely to deflect a ball. Under such conditions the outlets are recessed in the ceiling, permitting a flush fixture to be used. A standard fixture of this type is on the market and includes a large outlet box which is set flush with the ceiling, a receptacle for the lamp and a mirror reflector with a special grille which finishes flush with the ceiling. It is made for lamps of up to 500-watt capacity and is spaced 10 feet or more between centers depending upon the height of the ceiling.

Where the gymnasium has a balcony, provision must be made for lighting under the balcony; as a rule ceiling outlets are used, and the type of fixture just described is rapidly replacing the guarded type formerly used for this work. Where, however, wall outlets are required, as at doors or for pilot lighting, the guarded fixture is the best that can be obtained. For lighting over the balcony, the standard type of ceiling collar is ample, these collars spaced to give uniform illumination over seats, the circuits feeding and controlling from the gymnasium panels. Running tracks, as a rule, will be lighted from the overhead illumination of the gymnasium.

All doors and exits from the gymnasium should be fitted with illuminated exit signs, duplicating those used in the assembly hall. The signs should be set flush and should have the word EXIT in red letters 5 inches in height. Each sign is fitted with two receptacles for 25-watt lamps, the receptacles wired in multiple. For small gymnasiums, where exhibitions are not to be given, the signs are sometimes omitted, but while the code does not at this time demand the installation of illuminated exit signs for school work, nearly all local ordinances require their installation, and in the writer's opinion it will be but a short time before the exits from all school buildings will require exit signs of this type.

The exit signs must be wired on a circuit or circuits separate from all other outlets in the gymnasium and must be controlled from a separate switch and from a separate feeder from the main switchboard. There are two feeders, therefore, from the main switchboard to the gymnasium panels, so that in the event of the main lighting circuit's being cut out from the opening of a fuse or other accident, the exit lights will still be in service. The use of two outlets in a sign is to provide light at the outlet in the event of one of the lamps going out. In addition to the exit signs at the exit doors of the gymnasium, similar signs should be located at all exits in the corridors and from the building that are to be used with the gymnasium, and all of these signs should be connected to and controlled from the exit circuit of the gymnasium. Exit signs should be so placed that there can be no misunderstanding on the part of strangers leaving the gymnasium as to the exits, even when the corridors, etc., may be filled with smoke.

Each half of the gymnasium should have a program bell and secondary clock connected with the school system; the dial of the clock should be not less than 18 inches diameter, and the front should be of wired glass. The clock and bell should be so located that they cannot be readily struck with a ball during a game. The bell should be of the corridor type with gong of from 5 to 6 inches.

With the use of instructors' offices, each office should be fitted with a 12-inch dial clock and local telephone, and where the instructors have (as in some schools) more or less business outside the building, an outside telephone should also be provided as well as one or two wall receptacles for use with portable electric equipment. Where the gymnasium is divided by means of folding doors, no electrical provision has to be made for the opening and closing of these doors; where, however, a

curtain is considered, provision should be made under the wiring contract for the operation of the curtain. This requires a motor circuit (for large curtains, as high as 5-horsepower in capacity), the outlet being located at some point over trusses where connections can be made to the motor. The machinery for the operating of the curtain will be similar to the ordinary electric dumbwaiter push-button hoisting machine, the wire cables operating through suitable pulleys. A master switch outlet must be located near the motor or machine, and a ¾-inch conduit must be run from the location of the machine to the point or points from which the curtain is to be operated. As a rule the point of operation will be near the panelboard in the gymnasium. A push-button switch enclosed in a flush locked cabinet or a standard type of lock switch may be used if desired. The conduit system only is required under the electrical contract.

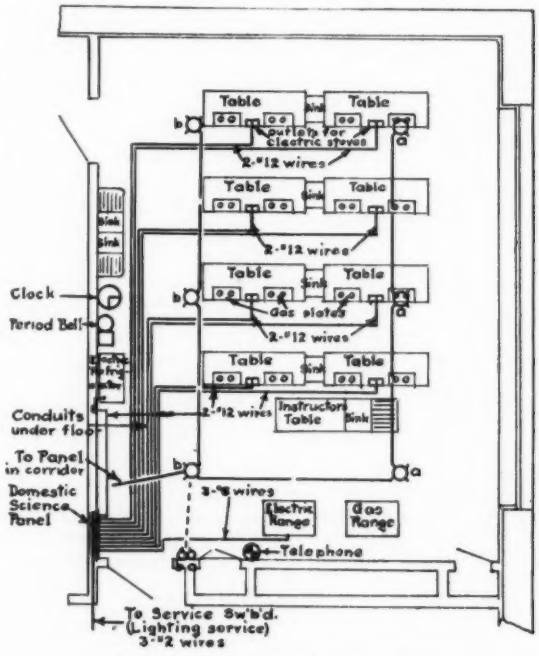
The Assembly Hall. The high school assembly hall will not only be used for school work and lectures, but as a community center will often be used for school plays and even more advanced theatricals; as a result, the hall must have reasonable electrical equipment to permit the work to be carried out. Certain of the work will come under the code requirements for theater wiring, although the details of the equipment will not be as complete as that required for theaters.

The wiring system should be separate from that of the remainder of the building, part being controlled from the stage and part from the lobby panelboards. In general all ceiling lighting, stage wiring, footlights, proscenium lighting, etc., will control from the stage panel, while all emergency, fire escape, moving picture booth and exit lighting will be controlled from the lobby. Separate feeder mains will feed the stage and lobby panels from the main switchboard, and a separate circuit for emergency and exit lighting must be run from the main switchboard to the lobby.

Ceiling Illumination. The type of ceiling illumination used for the hall will depend upon the design of the ceiling, and may consist of pendant chandeliers, reflected light through ceiling glass, or indirect illumination by means of coves or by receptacle outlets spaced in the front of the ceiling beams. Indirect illumination from concealed coves, while satisfactory when properly designed and balanced with some form of direct light, is not as a rule desired, as more wattage is required for the lighting of the room; it is more expensive to install, and since the coves gather dirt, frequent cleaning is required. There is more or less breakage of lamps in the cleaning, particularly if the ceilings are high.

With a flat ceiling the outlets may be spaced as desired, and for this work a simple form of pendant chandelier of the fiber variety, employing a number of frosted ball type lamps, works out well and is not expensive to install. Such fixtures should be provided with lowering winches set in the attic space over the hall, so that the fixtures may be lowered for cleaning and the replacement of lamps. The outlets should be set in the attic space and should consist of polarized receptacles in gang boxes, these circuits being numbered, with corresponding numbers placed on the plugs. The lamp circuits on the fixtures terminate in the plugs so that the plugs may be removed when the fixtures are lowered. The numbered plugs and receptacles permit the connecting of the proper circuits when the fixtures are again in place. When this construction is used the electrical contractor should provide a galvanized iron ground or ring approximately 8 inches in diameter, this to be delivered to the builder and set in the ceiling of the assembly hall at the time of construction, permitting the ready lowering and raising of the fixtures.

Where the ceiling is heavily beamed, fixtures as already described may be spaced at intersections in ceiling panels, the number of course depending upon the ceiling design; as a rule, however, not more than two or four major fixtures and two smaller fixtures over the balcony should be considered. One satisfactory method of lighting a hall with deep ceiling beams is by means of fiber ceiling receptacles closely spaced at the front of the beams. This prevents the source of light being seen from the rear, and reflects the light toward the stage. This method is less expensive than the use of the larger fixtures and gives very satisfactory results. When such receptacles are used they should be connected alternating on the circuits, and controlled from the stage panel so that the whole or a portion of the ceiling illumination may be used.



Typical Layout for Domestic Science Room

An Architect's Own House

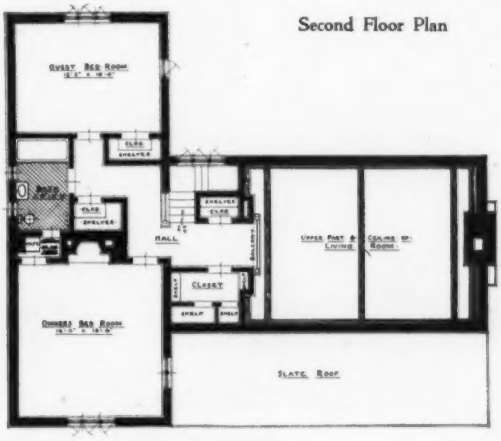
DESIGNED BY F. L. S. MAYERS, OF THE OFFICE OF BERTRAM GROSVENOR GOODHUE

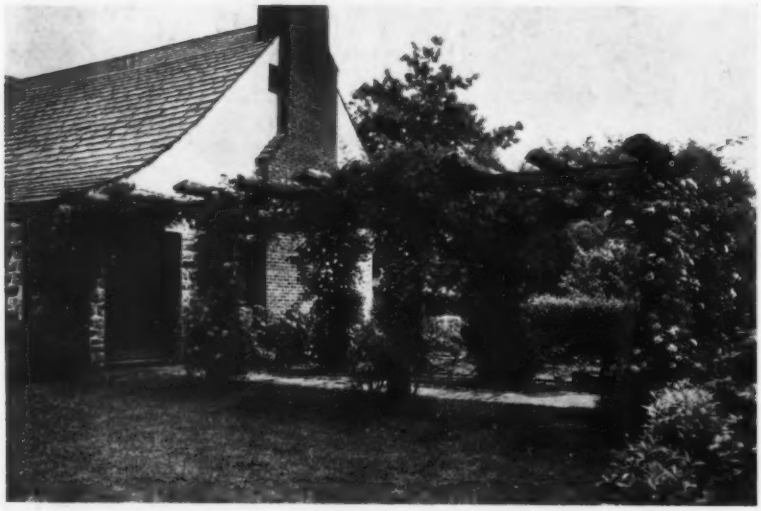
THERE are few buildings which hold forth possibilities more interesting than the home which an architect builds for himself. Here at least he may give free rein to his imagination, unrestrained by the desires or requirements of a client; here he may carry into actual execution plans which perhaps he was obliged reluctantly to lay aside, and with himself as a client work out his free and untrammeled idea of harmony of plan and elevation, of mass and detail.

This house at Shippan Point, Connecticut, is built upon a level plot, the ground falling away in front to Long Island Sound; delightful glimpses of the water are afforded through the treetops from the porch, an out-of-door living room, its red quarry floor being raised but two steps above the ground. The lines of the exterior suggest the vigorous grace of the modern English domestic type, the windows with their leaded casements being grouped, which makes possible broad ample areas of wall surface which give an expression of strength and dignity. The color scheme of the exterior, a combination of stone and stucco, is as harmonious as a careful selection of materials could make it; masonry where exposed is of local Connecticut stone, roughly dressed and varying in color from a cool

First Floor Plan

Second Floor Plan





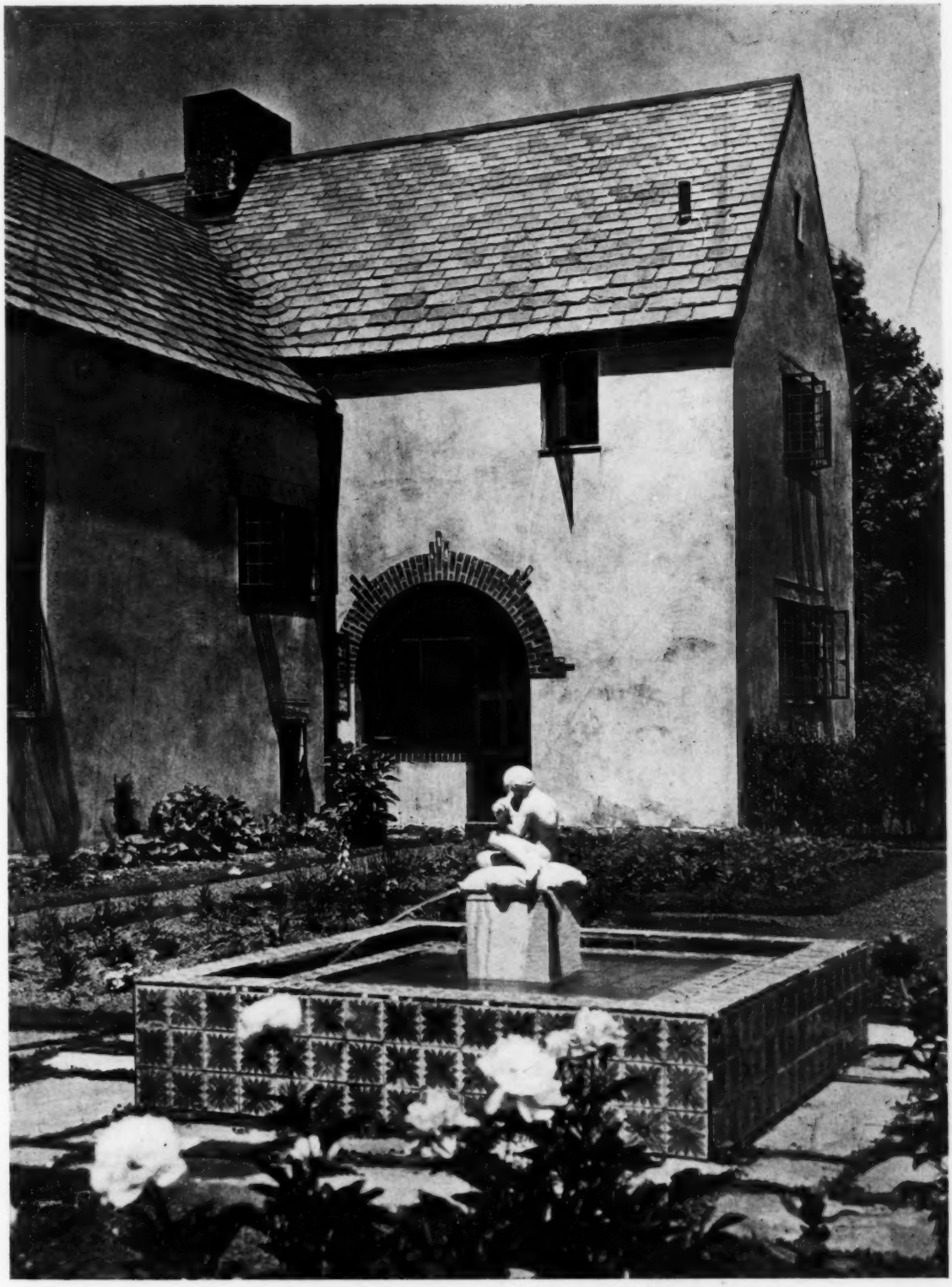
One End of House, Seen through the Pergola

blue-gray to a warm russet brown. The stucco is of a rich, creamy yellow which with the red brick of the heavy chimneys and the arch above the garden entrance adds the necessary touch of warmth. The woodwork of lintels, porch beams and posts and the timbers of the pergola are of a weathered gray. The roof with its broad expanses unbroken by dormers is covered with fading green slates in graduated widths and thicknesses laid with rounding valleys, and ridges and gutters are of copper which is now taking on a soft gray-green tinge.

The owner started out with the idea of a "bungalow" in mind,—a "bungalow," that is, in the original sense of the word. The plan is, in effect, a two-story wing, containing dining room, kitchen and bedrooms, attached to a single-story living room and porch, but the welding together of the two parts has been so managed, within as well as without, as to at once express and conceal the union. Interior trim has been reduced in extent to a minimum, in keeping with the studied simplicity of the house's exterior, and is of dull gray-brown oak. The floors of the most important rooms are of random width oak boards, and the walls and ceilings are of rough surfaced plaster with bands or friezes of plaster modeled in low relief.

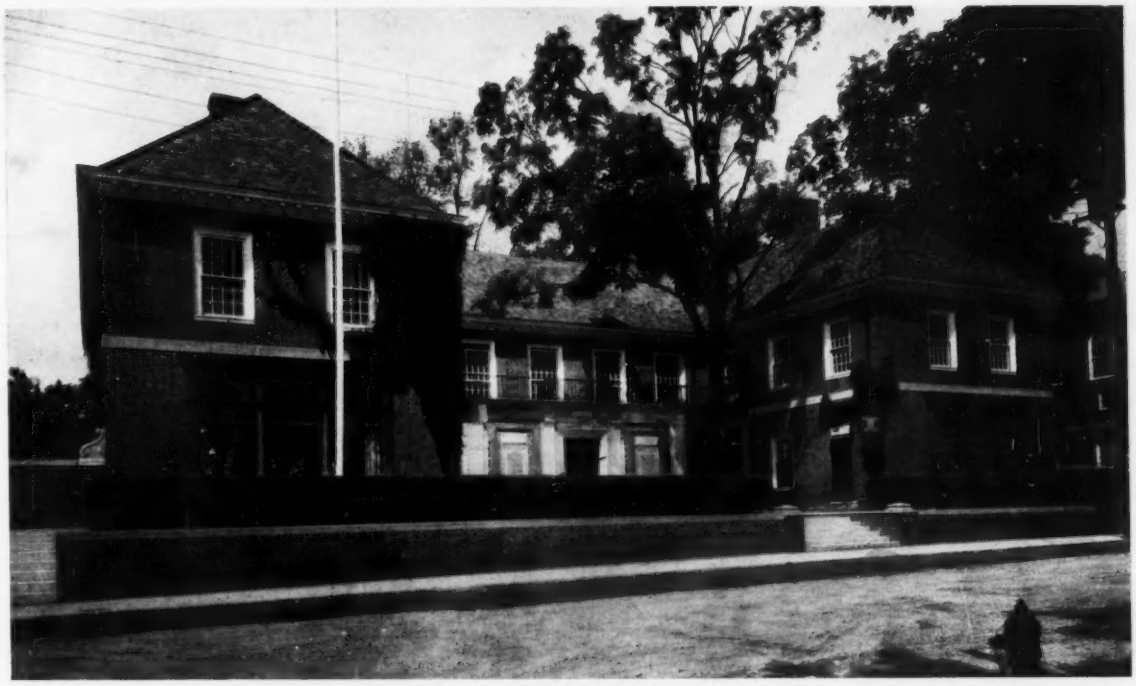
The plans provide for a small number of spacious and well designed rooms. The living room is full two stories in height, with a balcony at one end which is reached from the upper floor hall. The maid's room with its bath is placed upon the main floor, and the entire upper floor is given up to two bedrooms and their bath, both the bedrooms having window ventilation. Providing cross-

View of the Garden Entrance Showing Casement Windows in Living Room



HOUSE OF F. L. S. MAYERS, SHIPPAN POINT, STAMFORD, CONN.

F. L. S. MAYERS, ARCHITECT



GENERAL VIEW

DETAIL OF ENTRANCE COURT

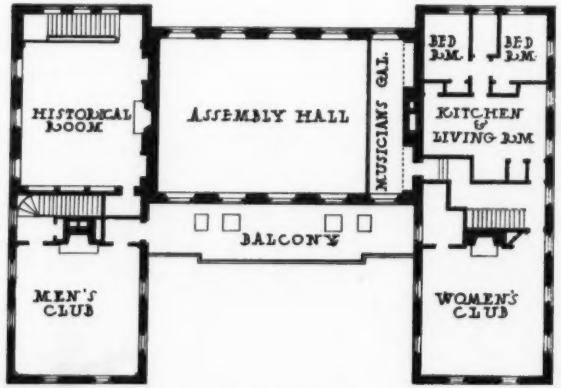
PETERBOROUGH HISTORICAL SOCIETY BUILDING, PETERBOROUGH, N. H.

LITTLE & RUSSELL, ARCHITECTS

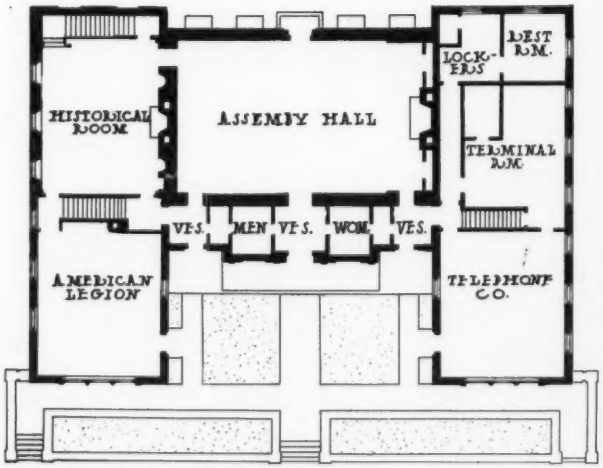
DETAIL OF FRONT, SHOWING TOWN HOUSE IN DISTANCE

PETERBOROUGH HISTORICAL SOCIETY BUILDING, PETERBOROUGH, N. H.

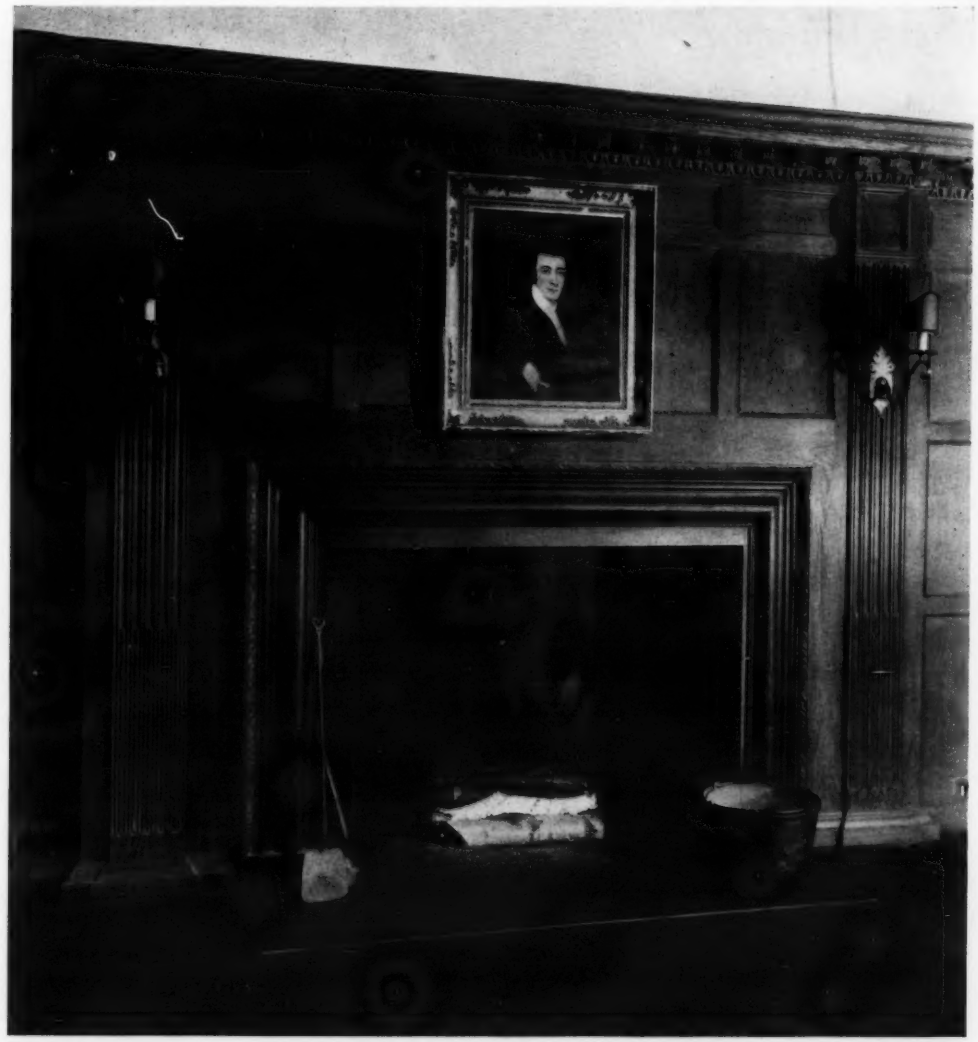
LITTLE & RUSSELL, ARCHITECTS



SECOND FLOOR PLAN



FIRST FLOOR PLAN

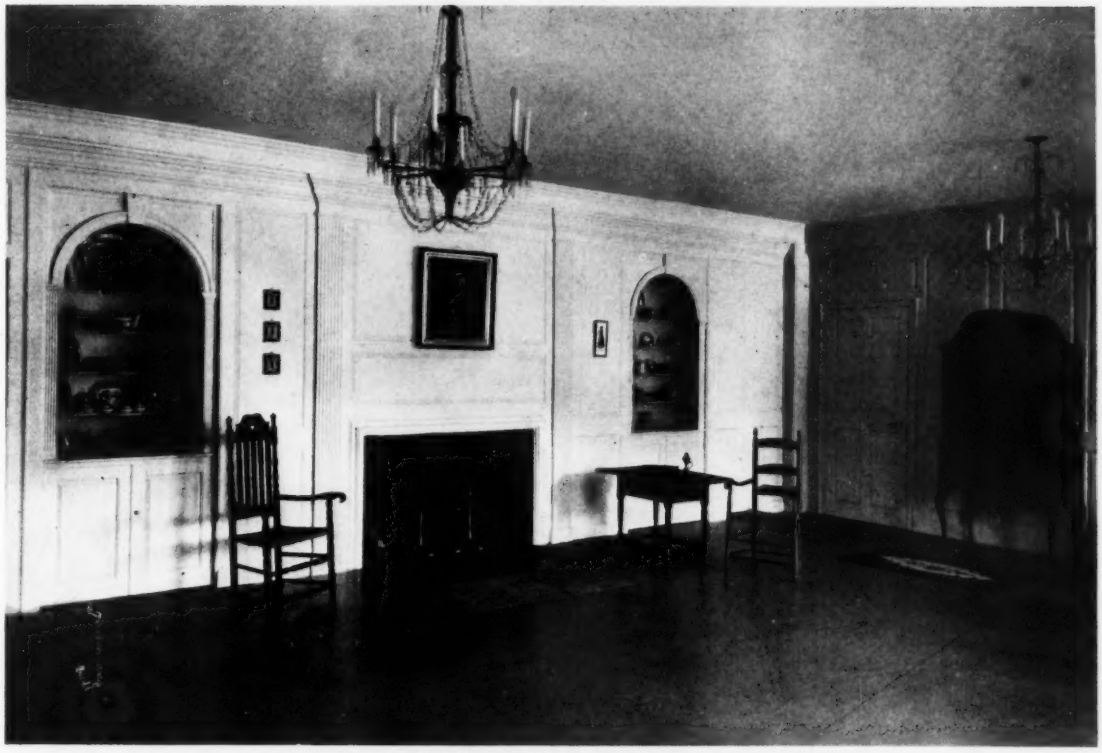


DETAIL OF FIREPLACE IN ASSEMBLY HALL

PETERBOROUGH HISTORICAL SOCIETY BUILDING, PETERBOROUGH, N. H.

LITTLE & RUSSELL, ARCHITECTS

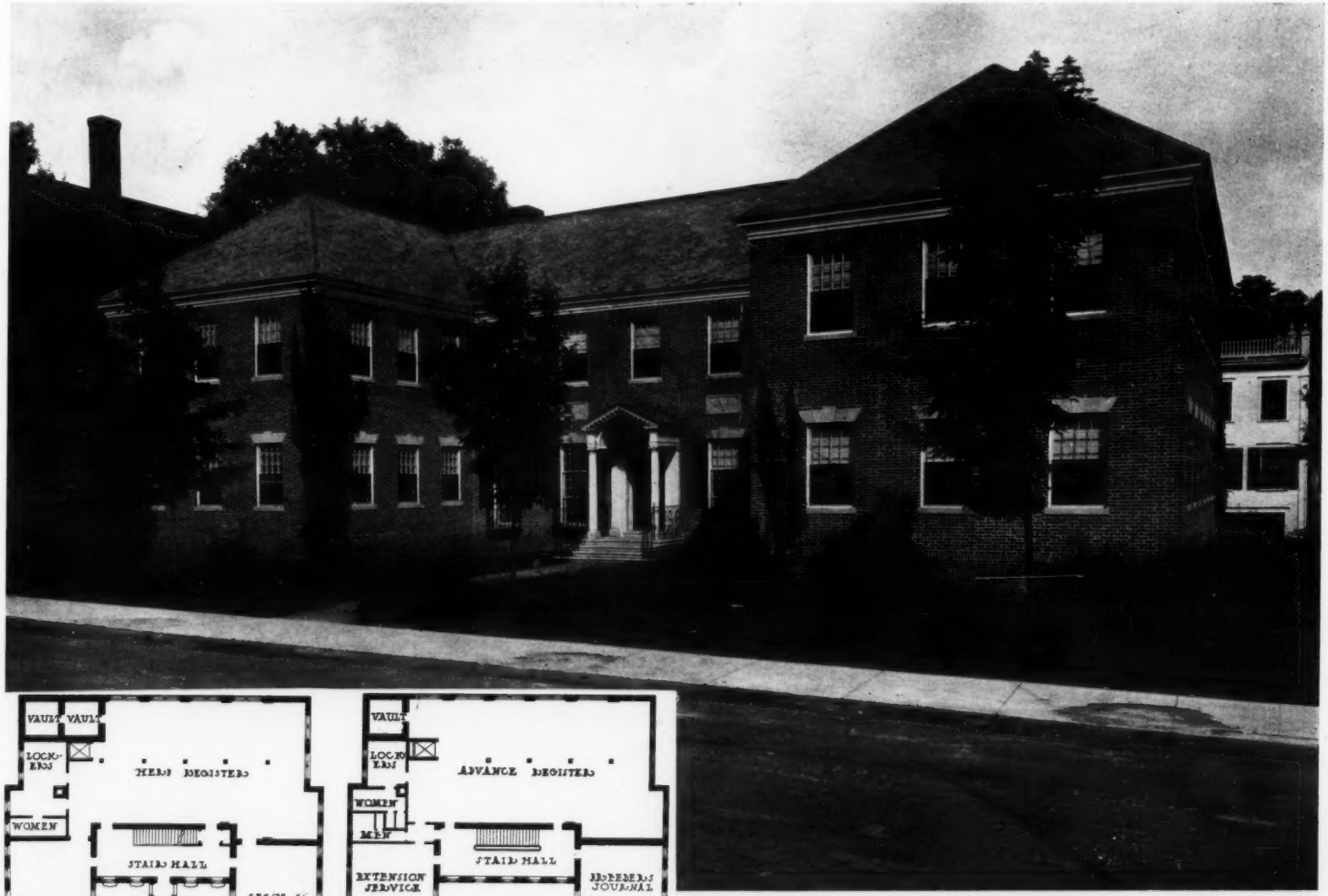
HISTORICAL ROOM ON SECOND FLOOR

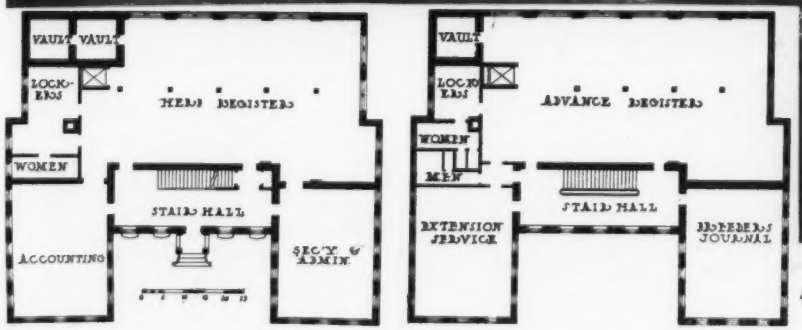


HISTORICAL ROOM ON FIRST FLOOR

PETERBOROUGH HISTORICAL SOCIETY BUILDING, PETERBOROUGH, N. H.

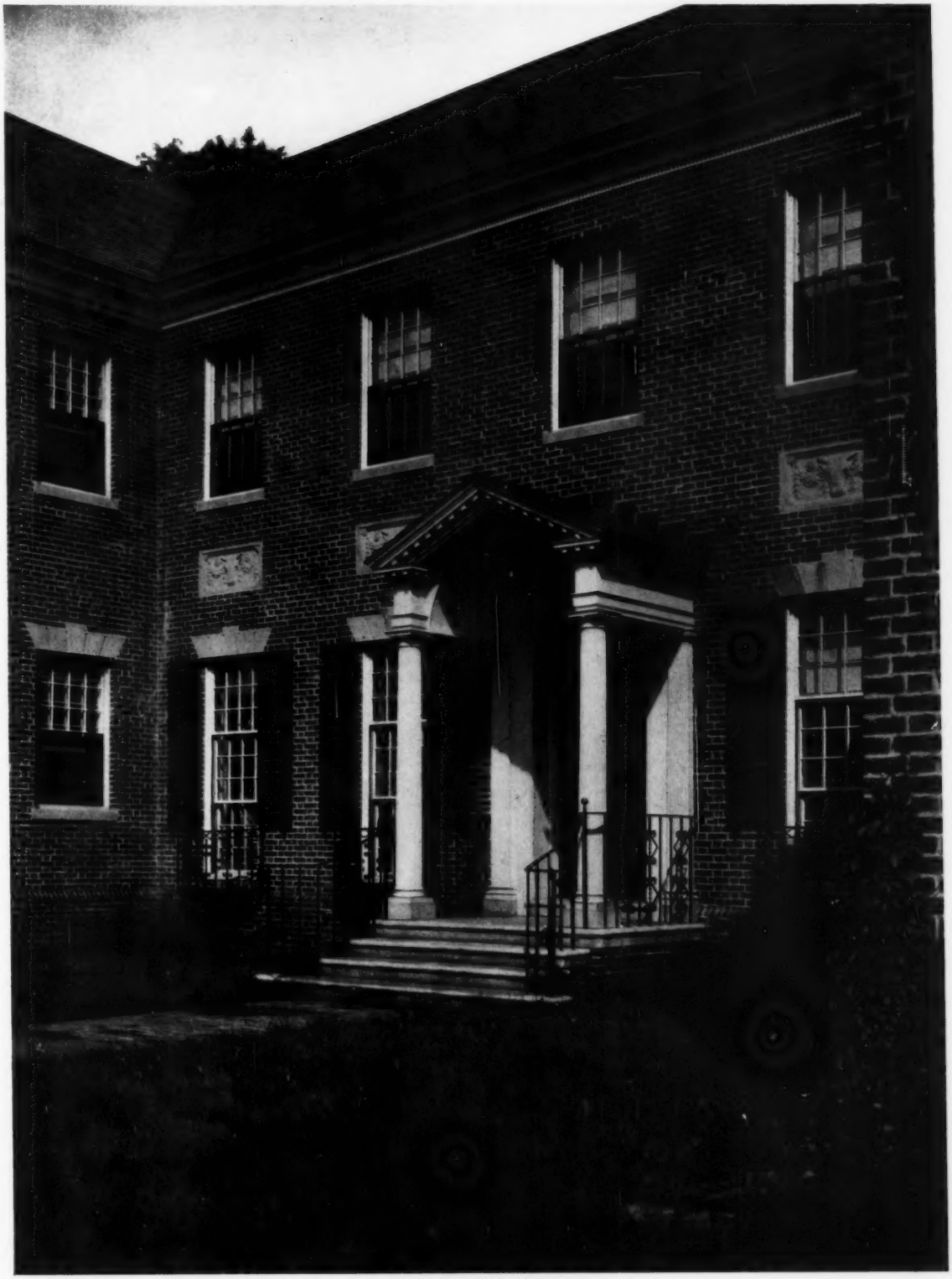
LITTLE & RUSSELL, ARCHITECTS





AMERICAN GUERNSEY CATTLE CLUB BUILDING, PETERBOROUGH, N. H.

LITTLE & RUSSELL, ARCHITECTS



DETAIL OF ENTRANCE FRONT

AMERICAN GUERNSEY CATTLE CLUB BUILDING, PETERBOROUGH, N. H.

LITTLE & RUSSELL, ARCHITECTS

Concrete Construction

III. TYPES AND LIMITATIONS

By WALTER W. CLIFFORD, *of Clifford & Roeblad, Engineers*

THE use of concrete is not the solution of every structural problem as some enthusiasts would have us believe, but it probably has a wider range of uses than any other building material.

In considering the relative desirability of concrete, wood or steel for complete buildings, the points to be considered are first cost, maintenance and depreciation, appearance, fireproofing qualities and speed of erection. For factories, warehouses and similar structures, first cost is usually the main consideration. For semi-public buildings, such as stores and hotels, a fireproof structure of satisfactory appearance is the first essential, but cost is usually a close second in importance. Only in monumental buildings and in the highest type of residence construction does first cost drop into the background, and even in these classes of construction it has an unpleasant habit of dominating the background. Steel and wood are used only for skeleton framing in connection with masonry walls, excepting for small or temporary construction, while concrete may be so used but may also be used for the exterior walls.

The first cost of concrete construction as compared with wood or steel is a matter of many variables. The required plant for concrete work,—mixer, engine, barrows, carts, etc.,—runs up the cost upon small jobs, particularly if they are located in places not easily accessible. For any city work contractors are equipped with portable mixers having direct-connected motors or gasolene engines which do not carry a very heavy rental charge. Required column spacing and the live loads to be carried are the most important considerations. The dead load of concrete construction is usually heavy compared with wood or steel, so that for very light live loads or long spans concrete is usually more expensive than steel. Normal column spacing for concrete construction ranges from 16 to 30 feet, although most concrete bays are from 20 to 25 feet square. Compared with 10 x 20 bays in wood construction, the saving in floor space by the omission of columns is obvious.

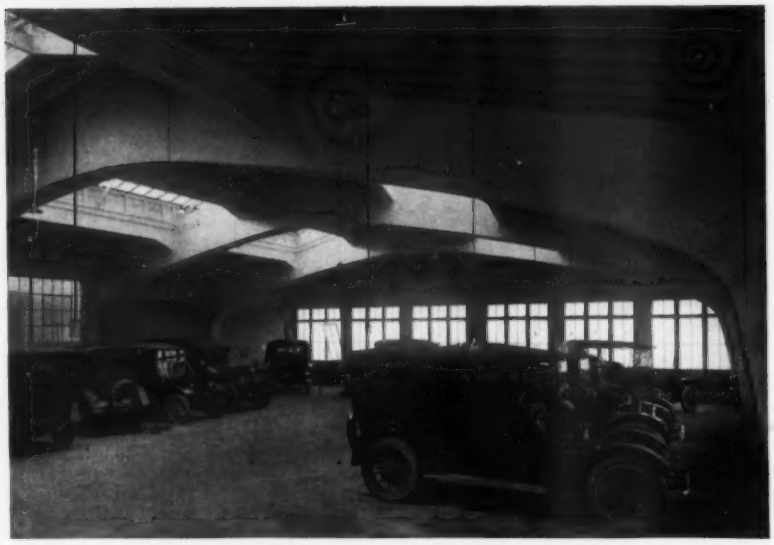
For ordinary factory buildings there is very little difference in cost between concrete and wood construction with brick bearing walls. There have been times in the last few years when concrete was less expensive than mill construction. At the present time for from 100 to 150 pounds per square foot live load the mill construction is perhaps from 10 to 20 per cent cheaper, but it will have twice as many columns. For heavier live loads (200 to 250 pounds) concrete is probably fully as cheap.

For these simpler buildings concrete is cheaper than bare steel and much cheaper than steel fireproofed. For buildings not heavily loaded, such as schools, office buildings, etc., concrete costs more than light, fire-hazardous wood construction, but less than steel for buildings not over five or six stories in height. For taller buildings with light live loads the added dead load of concrete brings too much load on the columns for economy. The buildings of the Massachusetts Institute of Technology at Cambridge are a fine example of the economical use of concrete in buildings of the better type. The framing of these buildings is the common schoolhouse type with a central corridor and classrooms on each side. For long roof spans (50 feet and over) nothing can compete with the steel truss if second class construction is permissible. For first class construction, or with heavier loads, concrete is usually an economical possibility. In the matter of maintenance, painting, use of glass and such items, which are practically the same for all types of construction, play such a large part that the difference in upkeep cost is not great. Considered as to depreciation, however, concrete is unexcelled; it is the most permanent form of construction known. As

Floor of Buick Building, Washington
An excellent example of simple beam and girder construction
A. W. Brown, Architect

first class construction, concrete of course carries the lowest insurance rate.

Appearance counts for little in the factory building. Concrete is as amenable to good mass effects as any material. Detailed surface treatment giving an appearance at least equal to that of the usual brickwork can be had at small expense by methods considered in a previous article. By using precast concrete or cast stone the possibilities of surface treatment are unlimited. For interior work, untreated concrete can by the use of good forms be made as pleasing in appearance as any raw material. The better finishes are applied, and the possibilities and cost of applying plaster, paint, etc., to concrete are not far different from applying them to other materials.



Concrete Portal or Rigid Bent. A special type of beam which is economical for first class construction
Miller, Woolley & Evans, Architects. Villadsen Brothers, Inc., Engineers

If properly constructed, concrete is unexcelled in its resistance to fire. City conflagrations have repeatedly proved this. Concrete must be properly designed, however, without yielding to the temptation of cutting down the thickness of fireproofing for the sake of cheapness. Steel properly and completely fireproofed with terra cotta approaches concrete closely in fireproof qualities, but at a far greater expense. Good mill construction of wood is next in value, and exposed steel the weakest in resistance to fire excepting for flimsy wood construction. There is little difference in speed of construction of good sized buildings between concrete and steel or wood. In the field steel can be erected more rapidly, but the time required for fabrication is longer.

An Example of Special Beam Framing

To summarize, concrete excels other materials in permanence and fireproof qualities. For ordinary commercial construction it requires only half as many columns as wood, and it is materially less expensive than steel. With heavy loads it is cheaper than wood construction. Steel costs less only in very tall buildings and where live loads are very light and spans long. In appearance concrete can be made satisfactory for all but monumental work.

There are several types of concrete construction, however, each peculiarly adapted to certain conditions. The slab, beam and girder type is the original form in which concrete was used for floors. Beams and girders are located much the same as they would be in steel construction. It is the most largely used type and is the only one adaptable to all conditions where concrete can be used. With any other system beams are necessary as spandrels and for framing about stairs, elevator shafts and other openings.

A rather special type of beam construction is the long span concrete portal

for roofs. It is used in garages and similar buildings for spans of up to 75 feet where first class construction without columns is required. It is a cheaper construction than a fireproofed truss, and in the shorter spans cheaper than the exposed truss.

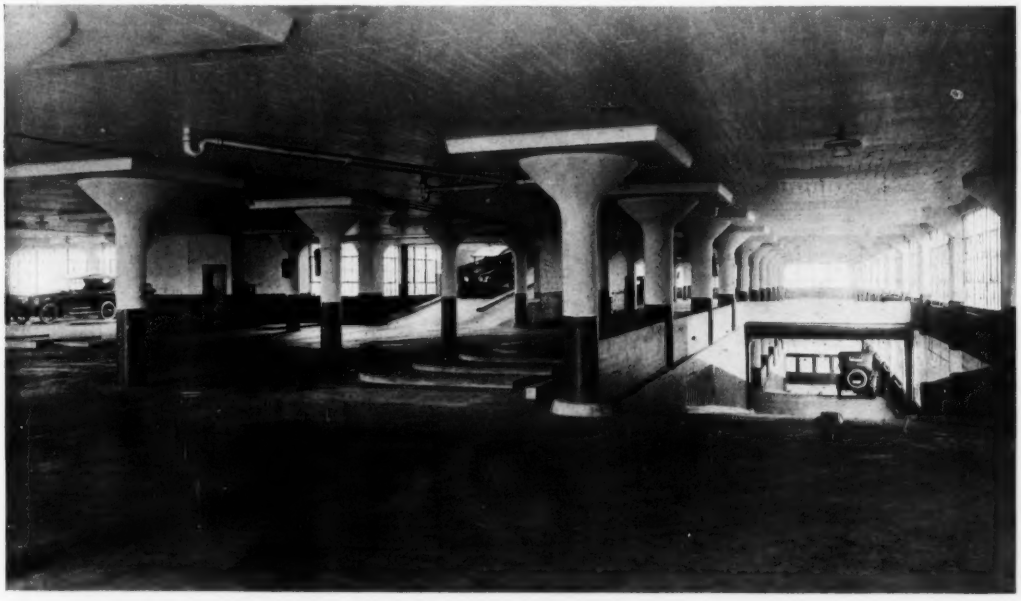
For conditions to which it is adapted, the girderless floor, also called flat slab or mushroom, is unequaled for economy. It also has other advantages and a few disadvantages. The structural conditions under which flat slab floors are at their best are with square bays of from 16 to 30 feet on a side and live loads of 150 pounds per square foot or more. Since the slab rests directly on the spread column heads the ceiling is clear and smooth, which makes for the better distribution of light and heat or for the hanging of pipes or shafting. By placing the spandrel beam above the slab, as is commonly done, sash may extend to the ceiling which is a very great advantage where a deep room is to be lighted. The thinner floor means less height, floor to floor, for the same clear height will often allow 11 stories in a building which would have but 10 with beam framing. Where height restrictions are in force, a 10 per cent addition in rental space is an unanswerable argument in its favor.

The one thing commonly urged against flat slab construction is its appearance. It is primarily suited to large open spaces, and it must be admitted that running partitions promiscuously into large column capitals often produces sad results. Moreover, since the size of the column head is determined by structural considerations and dependent on the column spacing, in the smaller upper story columns the capital is likely to be so large as to be difficult to treat effectively. With the larger columns of the lower stories the head is more nearly in scale and amenable to satisfactory treatment. The Paine Furniture Company's building, one of Boston's newer stores, contains what is a good example of high class flat slab work.

The third common type of concrete construction is the ribbed floor, produced by placing tiles on the form and pouring concrete over and around them so as to make ribs between the tiles and a light slab over them. The top slab is from 1½ to 3 inches thick and the tile from 6 to 12 inches thick, making a total floor thickness of from 8 to 15 inches. Terra cotta tiles are usually 12 inches wide, making the spacing of the ribs 15 to 16 inches on center. Specially formed steel tile are also used in this way, giving a somewhat lighter floor. These are made to give 24-inch centers on ribs. Ribbed floors are used as one-way slabs with parallel beams, or as two-way slabs with a beam system which divides the floor into panels square or nearly so.

One system also makes use of metal tiles to construct a ribbed flat slab floor, in which the entire ceiling is flush with the bottom of the drop panel, this panel itself being solid and the rest of the slab a grid of ribs. These floors are primarily suited to light live loads (50 to 150 pounds) and spans of from 20 to 30 feet or more. Where a flush suspended ceiling is required this form of construction is often lowest in cost.

The one-way terra cotta tile and rib construction is little used and is seldom the most advantageous. There is a two-way tile and rib system which leaves a uniform terra cotta surface for ceiling plaster that is used as a selling point. The beams with this system are usually flat, projecting only a few inches, or



Garage at Wilmington, Del., in Which Typical Flat Slab Construction Is Used
Thompson & Binger, Inc., Architects and Engineers

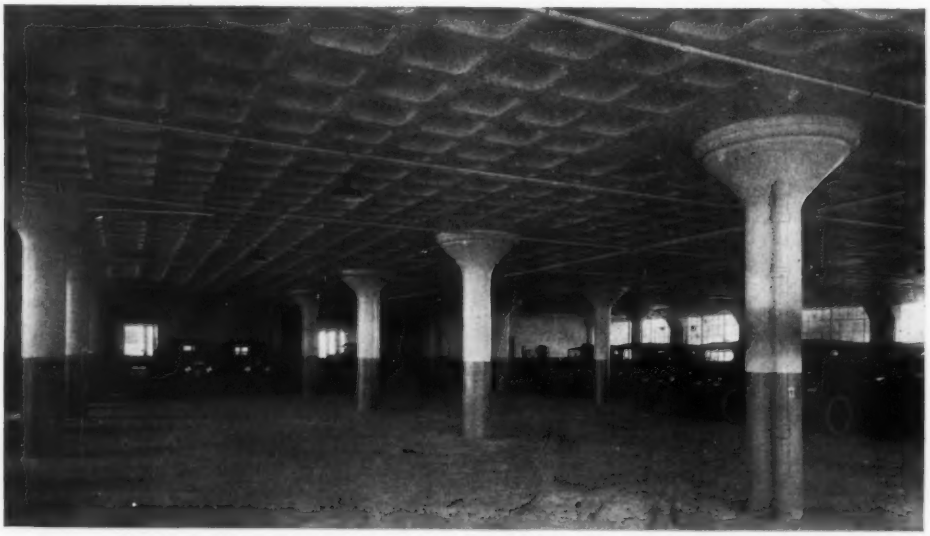
with shorter spans not at all below the ceiling. This system gives an excellent floor which is usually cheaper than structural steel and, including the finished ceiling, is often cheaper than plain beam and slab concrete work.

The metal tiles are used in both one-way and two-way systems. They are lighter than terra cotta tiles where left in the slab, and some kinds are removed with the rest of the forms and re-used. The metal tile is a competitor of flat slab construction for garages and similar buildings where the appearance of the ceiling is of no importance. Where column spacing is irregular the tile systems often offer an economical solution. Where the bays are square and uniform the flat slab type of construction, with or without tiles, is usually the cheaper.

Most types of concrete construction are, or once were, patented. This does not mean much at the present day, however. There is no patent on ordinary beam and slab construction as such. The fundamental flat slab patent has expired, which means that the ordinary two- and four-way systems are free to the world. A few other system patents are still in force. These are designed only by the patentees, who collect fees, usually paid by the contractor, to cover the design and royalty since they do not sell material. These fees are nominal and must of course be less than the saving made in material to make the use of the system economical. The one-way terra cotta tile system is unpatented. The two-way system is patented, but royalty is included in the price of material which is bought of the patentee. Costs of using such patents as exist in metal tile are covered in the purchase of materials. Deformed rods are in general patented, but the patented type is used simply as a selling point and does not add appreciably to the cost of material.

In considering forms of concrete construction the methods most advantageous for use are easy to determine. A warehouse or factory which can be divided into square bays and must sustain a heavy load is an obvious place for using flat slab construction. A schoolhouse is pretty surely a beam and slab job, with the slab ribbed by the tile in some cases. The type for a garage, department store or office building, on the other hand, may be more difficult to decide. Comparative designs of typical bays must often be made and their relative costs weighed with their other advantages and disadvantages. It sometimes happens that the deciding factor will be the contractor, for he will usually figure more closely on the type with which he and his men have had the most experience. Thus it will sometimes happen that a contractor will offer to reduce his bid by using a certain system on which other contractors would figure an increase in price. Where the general features will permit substitutions, as in most simple work, it is worth while to allow the contractor to make alternate bids even though it involves, as it must, having the substitution checked to insure its being equal in value to the original.

In the press of business details and more interesting architectural planning the matter of structural type does not always receive the attention which its importance to the client's pocketbook warrants. A difference of 10 per cent in the total cost of construction can easily be made by selecting the proper type of framing without any detriment to architectural features. The careful attention of experienced men should be focused on this problem of selecting the type of framing, and this should be done while the other features are being planned and not after their design has been so fixed as to make impossible economical construction, if the client is to receive the attention to his problem which he expects and deserves.



Automobile Service Building Showing Tile Construction (Removable Metal Tiles) Used with Flat Slab Design
A. S. Bowditch, Architect

Plate Description

TOWN HALL, TEWKSBURY, MASS. Plates 41–43. Planned with its main portion two stories in height and with wings one story high, this building is an excellent example of the small town hall, particularly when it occupies a plot of considerable extent.

The outer walls are faced with Harvard brick laid in an English bond. The chief details of exterior trim are of white marble, steps are of granite, and the pitched roof of the main portion is of slate. The lobby of the structure is arranged as a memorial to the men of Tewksbury who were lost in the world war. The assembly hall seats 500 and has a stage and balcony, and below is a banquet room provided with complete kitchen and serving equipment and seating 300. In one of the wings is located the village library, while the other wing contains the town offices, vaults, etc., and in the basement are the necessary coat rooms, boiler rooms and the town lock-up. The cubic area of the building is 189,350 feet, and the cost (in 1919) was $64,567, which included all contracts, separate water system and alterations to convert an old stable into an electric generating plant, but which did not include architects' fees.

GROUP OF BUILDINGS AT PETERBOROUGH, N. H. TOWN HOUSE, Plates 44–47; PETERBOROUGH HISTORICAL SOCIETY BUILDING, Plates 51–54; AMERICAN GUERNSEY CATTLE CLUB, Plates 55, 56.

TOWN HOUSE. The massing of the three buildings which compose this group secures for them an importance which adds materially to their interest.

The town house is much the type of building which would have been erected to serve the same purpose in any prosperous New Hampshire or Massachusetts town shortly after the middle of the eighteenth century. Since it stands apart from other buildings, opportunity is given for the free assertion of its architectural character—a slightly restrained handling of the American or colonial version of the Georgian style, such as was widely popular at the time. Material is hard burned selected water-struck brick, with trim partly of limestone and partly of wood painted white. Six tall pilasters with Corinthian capitals upon the main facade support the cornice and pediment, over which is placed an exceedingly graceful and well-scaled cupola. The brickwork of the reveals of the three entrance doors and the windows at their sides is painted white, a fashion which was much followed during the colonial period. The cubic contents of the building are 390,910 feet and the cost (in 1916) 17 cents per cubic foot, without equipment.

PETERBOROUGH HISTORICAL SOCIETY BUILDING. At one side of the town house stands the building of this organization, which has done much to foster the growth of New England traditions. With entire propriety, therefore, is it planned in the same colonial or "American Georgian" style used in the town house, and of the same materials, but with a slight modification as to some of the windows of the lower floor and a suggestion of luxury in the limestone trim about the main entrance. This structure is built about three sides of a square, the local office or exchange of the telephone company occupying part of one wing. A horizontal or "string" course extends around the building, between the windows of the lower and upper floors, which tends to emphasize the low, spreading character of the structure. Since the site of the building is a few feet higher than the sidewalk, a retaining wall of brick and limestone, the materials of the structure itself, has been used with excellent results. The interior is planned with the different rooms likely to be required by a historical society, and certain rooms are devoted to the display of historical relics. Contracts for constructing various parts of the building were let at different times from January, 1917 to May, 1922. The cubic contents are 232,520 feet and the cost 46 cents per foot, without equipment.

AMERICAN GUERNSEY CATTLE CLUB. Just across the road from the town house and the historical society's building is the home of the American Guernsey Cattle Club, planned in the same general style of the other units of the group but with some differences in detail. Designed like the historical society's building with wings extending forward from a main structure, its design is marked by the same care and restraint in the handling of its delicate but sufficiently virile cornice, the fluted columns and open pediment of the entrance portico, the wrought iron balustrades and window guards and the carved panels of limestone which are placed between certain windows of the lower and upper floors. This structure was built by day labor, begun in 1917. The cost per cubic foot, without equipment, was 28 cents and the contents 234,612 cubic feet.

TOWN HALL, KENNEBUNK, MAINE. Plates 48, 49. This unusually interesting example of the small town hall is of a type of architecture which agrees well with its setting in an old New England village, and its pleasing qualities are due to the care which has been expended upon its graceful, symmetrical design and upon choice of appropriate materials.

The grass course and steps are of granite; basement walls are of limestone; upper walls are of water-struck brick, while slate is used for the roof and wood for the cornice, the columns which support the portico, the facing of the main facade under the portico and the cupola which surmounts the building. Here the necessary town offices are placed in the lower or basement story, which is entirely above grade, leaving the entire main floor available for an assembly hall seating 950 and equipped with a stage and a balcony in which the seats are banked. The building is of second class construction and heating is from a one-pipe system with indirect ventilation. This town hall was built during the summer of 1920 at a cost of 30 cents per cubic foot.

EDITORIAL COMMENT

ARCHITECTS' ECONOMIC INFLUENCE

A CLOSER contact with the public and a correct understanding of its service have long been sought by the architectural profession. Occasionally hopeful signs appear that progress in this direction is being made, but it requires only a slight investigation to prove that little of the fundamental principles of the service architects render the public is understood by educated men, or even by those who have knowledge of building and real estate values.

This lack of understanding and appreciation is the greatest handicap to a proper development of architectural influence, and blame for the existing conditions cannot wholly be placed on the public; the architects themselves must accept it. In the efforts that have been made to span this chasm of misunderstanding, architects have always spoken in terms familiar to themselves but incomprehensible to the layman. They have placed themselves in the role of dictators of good taste and created the impression that highly developed forms of beauty come first in their consideration and that if the opportunity for creating such beauty does not exist they have nothing further to offer. It is but natural that this attitude places architecture in the light of a luxury, with the result that this false position has robbed both the public and the profession of untold opportunities.

The opportunities for creating architecture are potentially as great today as at the height of the renaissance, but the methods of procedure are as far apart as the poles. Architecture in the days of the renaissance was produced under the patronage of princely families of great wealth; today its opportunity lies in association with the development of business and civic enterprises. The necessity and desirability of high standards of art in our modern life are unfortunately not universally recognized, and when they are admitted the ability to judge good art is more often than not lacking. Justification of the architect's service on a basis of art value alone is therefore difficult to establish.

But in the perfection of civilization the architect has an even broader and more valuable function to perform than the creation of abstract beauty. Fundamentally he is a planner, endowed with the ability to visualize finished solutions of various problems. In the exercise of this talent lies his greatest public service, and it is this feature of his work that the public knows nothing of.

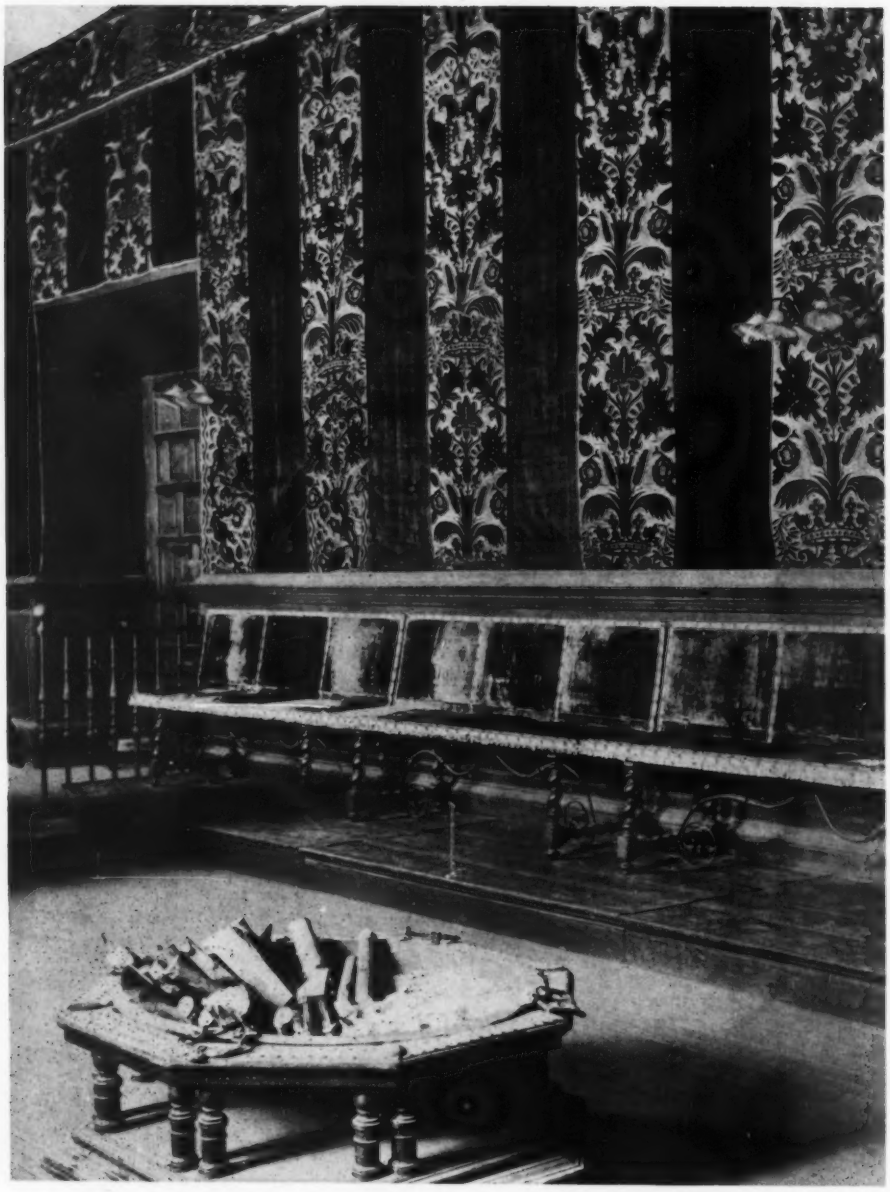
No better opportunity ever existed for proving this ability of the architect than that afforded by present conditions. Building costs are undoubtedly on a permanently higher plane; elements of waste in building plans, improper selection of equipment and lack of care in minimizing maintenance charges that in past years were comparatively negligible factors, have now assumed such importance that the financial success of any building is dependent directly on the efficiency with which these problems have been solved. In the element of planning, therefore, the architect can today prove that he is an economic necessity. He should extend his study in this field to great length; he must know land values and the economic relations between them and building types; be able to anticipate the direction of future growth so that the successful use of his building can be assured even under conditions different from those prevailing when it was built. He must be familiar with costs of operation and rates of depreciation for standard types of buildings so that his contact with the development of a building program may be continuous from the start of operations. With all this he needs to realize the very great importance of financing and the vast influence that is exerted on building plan and construction through the sources of building loans. It is a singular fact that many loaning institutions give but slight consideration to the character of construction or the quality of the plan of a building on which they loan funds, and it is reasonable to suppose that if a keener sense of the influence of plan in hastening or retarding building obsolescence were possessed by the officials of loaning institutions and by bankers, more stable real estate values could be enjoyed. Architects should therefore lose no opportunity of pointing out to bankers the value of good planning as an insurance factor in building loans and of advocating the establishment of regular inspection departments within loaning institution organizations in which men of broad architectural planning experience will study plans presented for loans for their economic value.

The architect's planning ability extends beyond the single building; it includes the grouping of related buildings and even the essential features of city planning. The opportunity for public service in this phase of planning is constantly arising in our cities because of rapid increase in population, expanding business districts and cramped arteries of communication resulting from the astounding increase in automobile traffic.

Let architects take an active interest in these problems and demonstrate in the opportunity thus offered the value of the service they can render, and the public will be quick to recognize its importance.

DECORATION *and* FURNITURE

A DEPARTMENT
DEVOTED TO THE VARIED
PROFESSIONAL & DESIGN INTERESTS
WITH SPECIAL REFERENCE TO
AVAILABLE MATERIALS



Walls hung with sixteenth century velvet, a plain surface alternating with another of bold figure; walnut benches covered with velvet. The decorative value ot this room is due almost entirely to the successful use of textile fabrics.

From "Spanish Interiors and Furniture"
© William Helburn, Inc.

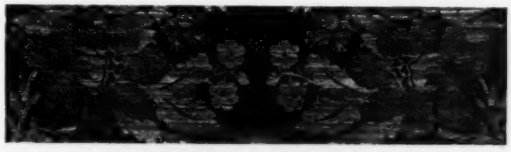
A Plea for the Architect's Interest in Fabrics

By HORACE MORAN, INTERIOR DECORATOR

SURFACE texture will decide the fate of any building material that might be considered in architectural design. It is a vibrating quality that is the overtone, playing all through the composition, adding interest to form and color and even creating the latter through the varied influence of light.

Textile fabrics, being all of a plane, must depend much upon this quality in their appeal to the eye, and weavers therefore have for centuries sought ways of employing the thread to create interesting surface. In addition to varying the direction of the thread and its thickness, the weavers secure texture by the use, separately or in different combinations, of two animal, two vegetable and two mineral threads. The silk and the wool offer the richest and most sumptuous of textures as in the damasks, brocades, velvets and taspestries. The flax and cotton are more durable and yet are refreshing and cheerful and make a simple direct appeal, being devoid of the subtle luster and richness of the animal threads. The two mineral threads, gold and silver, employed usually to embellish the silk weaves, are rarely used alone in the whole fabric and are, of course, too costly to employ with the more modest vegetable threads. Other groupings of threads are used, as for example, copper with cotton to simulate the silk and gold fabrics. Other natural fibers are at times employed, but need not be considered in this brief article. Furthermore, all the threads mentioned may be used in different combinations, either to enhance the effect of the cheaper, to lessen the cost of the richer weaves, to give strength to the fabric or to reduce the luster. The designing of textiles at all times has been governed by the same tribal or national influences that have controlled architectural and all other applied design. Man always did and always will weave, and this of all the arts perhaps has most universal application. Just one more thought before we consider the weaves made today for decorative uses. Most other materials at the service of the architect are stationary, fixed in permanent, rigid positions. Textile fabrics, when used as wall decorations, upon the contrary, owe much of their value to the fact that they are hung from above, the surface often falling with a slight fullness that affords play for light and shadow. It is this that gives the animated effect to a tapestry-hung interior which would of itself present but stolid, inert walls.

The architect, now that his engineer is relieving him more and more of many technical problems of modern building, is showing an increased interest in the decoration of the interior. It is hoped he will in the future find much to interest him in the decorative possibilities of the many textures at his service in the field of textiles. The kinds of woven fabrics are few in number and readily distinguished, but the varieties and the names used to identify them in the trade are hundreds in number and ever increasing as the manufacturers strive to gain attention by novel creations. An



Detail of Brocade Shown Below

Duppione Silk Brocade

Remarkable chiefly for its curious weave. The figure is made of a peculiar lumpy silk on a dull satin ground

Silk and Metal Damask

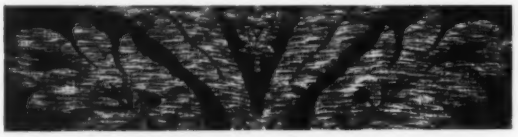
The design in satin is thrown out against a metal background, which is moiré to soften the effect

Figured Linen Velour
Design in cut and uncut, in two colors and two heights of pile on a ribbed background

Figured Silk Velvet
Reproduction of old weave showing one height of pile on worn-out satin background

understanding of the basic types of weave is soon acquired by a study of the collections of examples at any one of several museums, such as the Metropolitan Museum of Art or the Cooper Museum, both of New York. Museums of other cities are also gradually offering opportunities for this study. A number of excellent works have appeared in France, England and Germany, as for instance the thorough volume on the history of decorative silks, by Otto Van Falke. "Decorative Textiles," by George Leland Hunter is an interesting cataloging of textiles in detail, and the text shows much research into the literature of the subject.

A more direct way for the architect to crystallize in his mind the whole subject would be to visit one of the well known wholesale dealers in decorative fabrics and



Detail of Damask Shown Below

Silk and Linen Damask
In this weave the effect of metal is artfully obtained by use of a silk thread twisted on a thread of linen

ask for a showing of the various kinds and an explanation as to why some are serviceable for hangings and upholstery and others only for hangings. He could learn of the possibilities of fabrics, the very existence of which was unknown to him.

He could learn how patterns he wishes to use may be woven in colors not carried in stock, or how certain stock colors of one fabric may be used for other weaves of patterns. The manufacturer craves the co-operation of those æsthetically interested in fabrics; all through his commercial life there is a longing to improve his output, and that longing is but too little understood or encouraged by the artist. In the inner sanctums of these large establishments are groups of enthusiasts who revel in the discovery of some new ex-

pression of their art or in the success of some new trial of weaving or printing on cloth, much as do the architects upon the discovery of some new motif unearthed at Sardis or the finding of an unusual wall surface in some little hill town of Italy.

This article is illustrated with examples of the more useful decorative fabrics and printed cloths of today, which show at a glance the superficial effect of using the various threads, but only the actual handling of large lengths of the fabrics will reveal the decorative value of each and show how misleading is the practice of judging a weave by small cuttings or bits of pattern. Perhaps it is unnecessary to remind the architect, accustomed as he is to judging the materials he employs only by trials *in situ*, that the decorative effect of a fabric is subject more than that of any other material to the influence of the light and the adjoining colors and textures of its intended surroundings. An evil practice, much too common with those selecting fabrics, is to send untrained assistants to select "cuttings" at the dealers'. A lesser evil is to judge a larger length of fabric away from its intended setting, since only by long experience can even fair results be gotten by such a method. As has just been said, and it bears repeating many times, no fabric will reveal its appropriateness away from its destined setting.

The cataloging of things is an uninteresting theme, but for an understanding of this subject it must be resorted to and can very properly begin at this point. Of the three principal silk weaves damask is the most universal, and it is the material referred to by writers when they mention silk hangings. It is a flat textile, all on one plane, and although entirely of one color (or usually so) the design is produced by the direction of the background and the pattern threads which are woven into one another at right angles. Damask may be made with quite intricate and small patterns, but it is at its best in the great, bold forms which are characteristic of the period of the renaissance.

Brocades are ornamented damasks, produced by weaving on the usually one-color damask ground added patterns in colors. This might be regarded as a form of embroidery which, on the already interesting play of pattern, presents a wealth of lustrous design and color.

Velvets depend for their effect upon the projecting surface threads, giving an element of depth or thickness to the material. These threads may rise from the ground and return, forming an infinite number of loops, or the top of each loop may be cut, thus forming a pile surface. Variations of this result from cutting some of the threads and not others, so as to produce a design, or projecting the threads to different heights, forming two or more planes and thus adding to the intricacy of the design.

The splendid use of wool in tapestry has resulted in a fabric of the greatest endurance and the most interesting perhaps of all the products of the loom. The word may be applied to all simple weaves in which firm warp vertical threads are entirely engaged by the soft wool weft so that the warp is not exposed but asserts itself by giving a ribbed texture to the weft. This noble fabric, which has come down the centuries, being made on a hand loom and usually confined to the presentation of a woven picture, is a stately production and of great value for decorative use. The machine loom has made a heroic effort to approach the effect of the handmade

Handmade Woolen Tapestry
A very heavy fabric of interesting texture; design taken from an old Gothic tapestry

tapestry, but its success can readily be judged by a comparison of the two.

Linen and cotton fabrics are many in weave, and the illustrations suggest their varied character. These two materials are also commonly used as a ground for design printed in color, and when so treated form the group which is made up of chintzes or cretonnes.

There is a group of fabrics made by applying with the needle upon a plain ground a design made to conform to a given space. This includes embroidery, *appliqué*, needlework (*gros point* and *petit point*) and crewel work. Nothing has been said of laces and carpets, although these are both textile fabrics. They are so distinctly apart from the type of fabrics under consideration, however, that it is not necessary to more than mention them.

As to the decorative uses of textile fabrics, it is known that they are hung upon walls, they curtain window and door openings, form the surface covering of seats, are used for the hangings of bedsteads, cover pillows and cushions, and once were even used for bell pulls. What is perhaps not so well known is the art of selecting a fabric to produce a desirable decorative effect. It might be to enhance the color or interest of a room or to introduce a texture or surface of design in an otherwise cheerless place. Fabrics may be used not to introduce color or additional ornamentation but to increase the area of a color already in place. It is a matter of common observation that no matter how well designed an interior may be, it remains hard and cheerless until the introduction of an element that yields to the touch and by its appearance tells that it is not a part of the structure but a live texture, bearing color and design. That element is the textile fabric, the use of which dates as far back as the history of man, and makers of such fabrics in this country today are producing much that commands the attention of all who have to do with interior design.

Only those familiar with the products of modern textile manufacturers have any idea of their value. Reproductions are being made of the fabrics of many countries and centuries, produced by machinery, it is true, but possessing much of the character of hand-woven textiles, and this makes possible a varied choice.

Detail of Velvet Illustrated Below

Embroidery on Homespun Linen
Machine-made embroidery in imitation of old crewel work

Chintz Colored Figured Silk Velvet
Figure in colors in two heights of pile on satin background

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It has been the privilege of F. Schumacher & Co. to obtain exclusive rights in this country to this print. To see "Le Triomphe de Bonaparte" is to visualize its possibilities in homes Early American or Colonial in their inspiration as well as in those which reflect the Empire period. This rare linen print is now being shown in our establishment. It is one of many beautiful prints on linen we are showing. F. Schumacher & Co., Importers, Manufacturers, Distributors to the trade of Decorative Fabrics, 60 West 40th Street, New York. Offices in Boston, Philadelphia, and Chicago.

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SERVICE SECTION
of THE ARCHITECTURAL FORUM

Information on economic aspects of construction and direct service for architects on subjects allied to building, through members of THE FORUM Consultation Committee

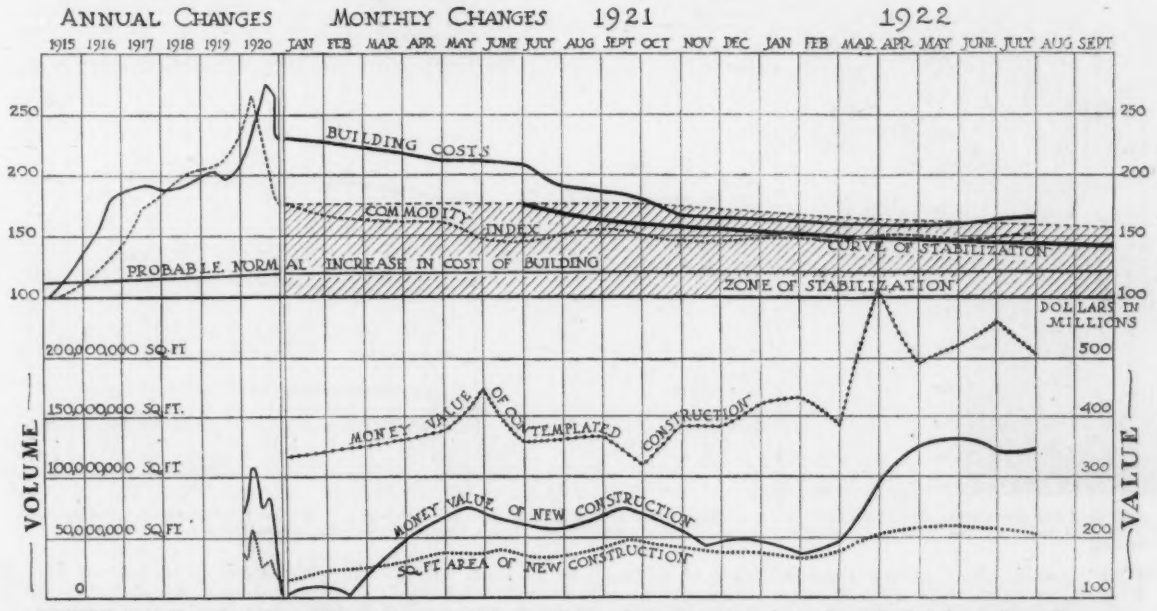
The Building Situation

FIGURES now available for the month of July show that the volume of construction activity was well maintained through the summer months. A study of the chart presented here indicates a natural drop in the line of contemplated construction. This was due to seasonal conditions and to the cutting down of speculative building because of a continued advance in building costs.

Expenditures actually contracted for in the building field held up well toward the peak of this year and at a rate considerably higher than normal. The relative position of the line showing square feet of new construction indicates that activity is continuing in approximately the same classes of buildings.

It will be noted that the cost of building continues to rise, and that this line is practically paralleled by the general cost of living as represented by the commodity cost line. This is a natural reaction, not only to the heavy demand for materials and labor earlier in the year, but as a general result of a greater volume of business in all industries.

In regard to types of new construction, there seems to be a trend away from speculative and residential, with an increase in the volume of public and institutional work. It appears strongly that we are now in the beginning of the predicted second wave of building activity, to be composed of larger and higher class units, such as public and institutional buildings. The fall finds architects generally busier than for many years, and this gives ground for optimism. Excepting for some artificial or incidental restriction it would seem that building activity would continue strongly. For many years there have not been available such large sums of mortgage money, and the confidence of the investing public in buildings as collateral seems to have been strongly asserted.

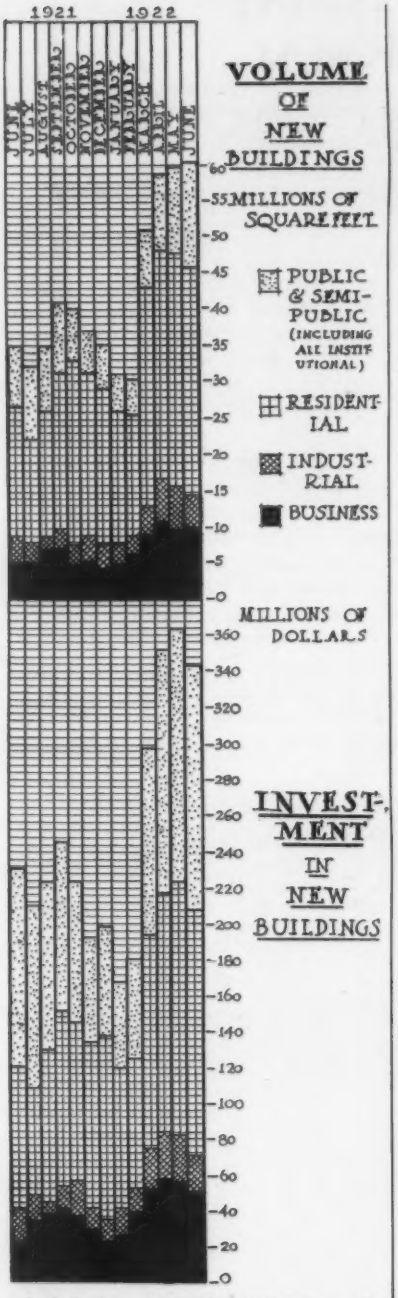


THIS chart is presented monthly with trend lines extended to the most recent date of available information. Its purpose is to show actual changes in the cost of building construction and the effect upon new building volume and investment as the *index line of building cost* approaches or recedes from the "curve of stabilization."

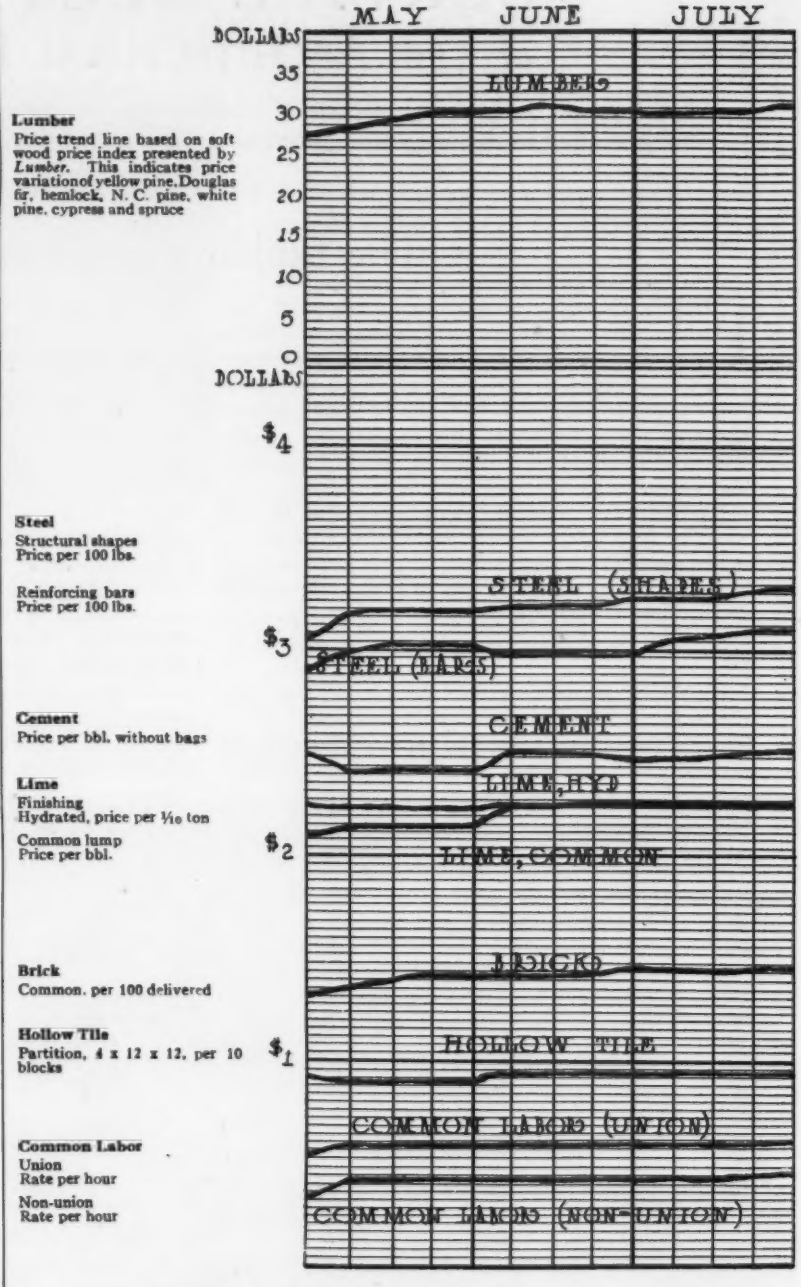
The CURVE OF STABILIZATION represents the building cost line at which investors in this field may be expected to build without fear of too great shrinkage in the reproduction value or income value of new buildings. The index line representing actual cost of building entered the ZONE OF STABILIZATION in the fall of 1921. If this cost line passes *out* of the zone of stabilization, building volume will decrease materially.

The degree of the curve of stabilization is based on (a) an analysis of time involved in return to normal conditions after the civil war and that of 1812; (b) the effect of economic control exercised by the Federal Reserve Bank in accelerating this return after the recent war, and (c) an estimate of the probable normal increase in building cost.

Factors of Fluctuation in Building Costs



Analysis of new construction showing comparative importance of major building types in volume and investment.



Figures used in developing all trend lines represent average prices to contractors in following cities: New York, Chicago, Denver, Seattle, Minneapolis, Atlanta, Dallas and San Francisco

THE graphic chart at the right is presented for the purpose of showing fluctuations in the prices of a number of important building materials and in labor costs. These fluctuations cover a period of three months and are shown in each issue of the Service Section in order to make possible at least a partial analysis of the building cost trend line as shown on the preceding page.

The volume and investment chart indicates that construction activity, as the result of contracts let in June, will decrease somewhat in the industrial classification, increase slightly in business and institutional building, and maintain approximately the same level in residential work.

The material field is showing a stiffening of prices. A slow but steady average increase developed during the summer which was the result of the heavy market developed in the first few months of this year. During the months of July and August the effects of the coal and rail disturbances were felt definitely in the building field and have added somewhat to the upward trend of the line of building cost as shown on the first page of this section.

It may be predicted that the fall season will show some reduction in the volume of residential construction because of seasonal conditions and because of the slackening of speculative building as the housing demand eases and costs increase.

BUILDING MATERIAL PRICES

Table Showing Average Prices Paid by Contractors for Building Materials at Local Distributing Points as of July 1, 1922. Prepared by Division of Building and Housing of the Department of Commerce from Prices Secured through the Bureau of Census

Commodity	Size or Condition	Unit	Mass. Fitchburg	Mass. Haverhill	N. Y. Buffalo	Penn. Pittsburgh	Penn. Erie	Md. Baltimore	Va. Richmond	W. Va. Fairmont	S. C. Columbia	Fla. St. Petersburg	Ga. Savannah	Mich. Lansing	Mich. Pontiac	Mich. Bay City	Wis. Milwaukee	Iowa Waterloo	Iowa Des Moines	Cedar Rapids
Common Brick		1,000	*$19.00	$20.00	$17.12	$16.00	$15.75	$18.00	$14.00	$19.30	*$12.00	$17.00	$13.50	*$13.00	$14.40	$14.00	*$11.50	$14.90	$16.00	$14.80
Portland Cement	Excl. of containers	Bbl	*2.75	2.90	2.36	2.50	3.00	2.85	3.40	2.34	*3.50	3.20	3.50	*2.50	2.29	2.21	*2.45	2.36	2.12	2.39
Yellow Pine No. 1	Dimension 2x4-16' S1S1E	M	.....	.....	.....	50.00	.....	39.00	25.00	45.00	.....	35.00	25.00	45.00	36.00	45.00	.....	33.00	44.00	43.00
Douglas Fir No. 1	Dimension 2x4-16' S1S1E	M	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	*40.00	36.00	44.00	.....
N. Carolina Pine No. 1	Dimension 2x4-16' S1S1E	M	.....	.....	.....	.....	.....	.....	25.00	35.00	*22.50	.....	.....	.....	.....	.....	.....	.....	.....	.....
Common Boards No. 1	1x6	M	*39.00	38.00	.....	47.00	.....	.....	32.00	47.00	*20.00	.....	.....	40.00	40.00	38.00	*38.00	36.50	42.00	35.00
Y. P. Flooring E.G."C"	1x4-10'-16'	M	.....	.....	.....	72.00	.....	125.00	70.00	72.00	.....	70.00	.....	70.00	.....	.....	.....	96.00	.....	86.00
Douglas Fir V.G. No. 2	1x4-10'-16'	M	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	96.00	95.00	.....
Red Cedar Shingles	Extra clear 16" 5 to 2	100 sq. ft.	.....	6.60	6.00	5.04	5.50	.....	.....	.....	*6.00	8.00	.....	6.00	5.75	6.00	*6.00	7.50	6.00	6.00
Cypress Shingles	Extra clear 16" 5 to 2	100 sq. ft.	.....	.....	.....	.....	7.00	.....	.....	7.25	*6.00	.....	.....	.....	.....	6.50	.....	.....	.....	.....
Composition Shingles	Crushed slate surfaced	100 sq. ft.	*6.25	8.00	.....	.....	7.00	.....	6.00	5.50	*6.25	8.00	6.50	.....	5.70	6.00	.....	7.75	.....	6.50
Gypsum Plaster Board	⅜"	1,000 sq. ft.	.....	45.00	45.00	37.50	50.00	25.00	40.00	25.35	*35.00	.....	40.00	35.00	23.93	45.00	*40.00	32.00	35.50	40.00
Lime	Hyd. Com.	Ton	*20.00	20.00	18.00	20.00	19.00	15.00	15.00	13.00	*20.00	.....	22.00	18.00	13.70	18.00	*18.00	20.00	27.50	18.00
Building Sand		Cu. yd.	*1.80	2.50	1.28	2.50	2.50	2.00	2.20	2.40	*.95	4.50	2.00	2.00	1.50	2.50	*2.25	1.50	.60	.90
Crushed Stone	¾"	Cu. yd.	*3.71	3.00	1.62	5.50	3.00	.....	3.00	4.50	*3.00	6.25	5.00	.....	1.48	3.75	*2.25	3.00	3.00	2.36
Window Glass	Single A 10"x12"	50 sq. ft.	*5.00	4.00	3.90	2.80	.....	3.60	3.50	3.80	*4.80	.....	.....	5.40	.....	5.15	.....	6.00	4.50	.....
Hollow Tile	8"x12"x12"	Each	*.22	.22	.20	.20	.18	.21	.16	.19	*.15	.20	.....	.17	.17	.16	.....	.13	.....	.14
Cast Iron Soil Pipe	4" E.H. 13 lbs. per ft.	Ton	.....	.....	58.80	55.20	.....	74.00	50.00	50.00	*48.12	.....	.....	50.00	52.00	51.00	.....	45.00	87.20	.....
Steel Pipe	1" galv.	100 ft.	.....	9.50	10.00	7.82	.....	7.95	7.50	7.50	*9.52	12.00	.....	.....	8.50	9.50	.....	9.57	9.37	.....
Reinforcement Bars	½" square	100 lbs.	*2.65	2.40	.....	2.47	.....	2.70	2.25	2.15	*3.50	5.50	3.10	2.50	2.40	2.30	*3.00	.....	2.68	3.00
Structural Steel	Fab. 6" I-beams	100 lbs.	*3.25	4.00	*3.20	.....	.....	.....	3.75	3.50	*4.00	.....	3.10	2.75	.....	3.10	.....	3.20	2.88	4.20
Gypsum Plaster	Neat	Ton	.....	21.00	13.50	22.00	24.00	.....	18.00	14.90	*20.00	.....	.....	.....	.....	15.00	*13.00	13.60	13.50	16.50
Roofing Slate	No. 1 Ribbon	100 sq. ft.	.....	.....	8.00	13.50	.....	.....	12.00	13.50	.....	.....	.....	17.50	17.10	17.00	.....	20.00	.....	.....
Tar Paper, Roofing	2-ply 75 lbs. per roll of	100 sq. ft.	.....	2.40	2.00	1.95	2.15	.....	2.25	.....	*2.25	.....	1.90	2.50	2.75	2.75	.....	.....	2.63	.....
Rosin Sized Sheathing	3-ply 30 lbs. per roll of	500 sq. ft.	.....	1.50	1.05	1.20	.85	1.25	.95	1.00	*1.00	1.25	.75	.75	1.00	1.00	.....	.....	1.08	.....

*Delivered at job

Commodity	Size or Condition	Unit	Iowa Council Bluffs	Mo. St. Louis	Mo. Kansas City	Ill. Chicago	Ohio Cleveland	Ohio Akron	Ohio Dayton	Ohio Cincinnati	Ohio Toledo	La. Shreveport	Texas San Antonio	Ariz. Tucson	Wash. Spokane	N. Dak. Grand Forks	S. Dak. Aberdeen	S. Dak. Sioux Falls	Calif. San Francisco	Calif. Sacramento
Common Brick		1,000	$17.50	*$16.35	$16.50	$11.00	*$15.00	*$15.00	*$17.00	*$17.00	.....	*$15.00	$13.00	$10.00	.....	$14.00	$16.50	$15.50	$15.50	.....
Portland Cement	Excl. of containers	Bbl.	2.44	*2.60	2.45	.....	*2.84	*2.56	*2.68	*2.59	*$3.08	*3.50	3.00	4.10	.....	2.55	2.60	2.70	2.63	$3.50
Yellow Pine No. 1	Dimension 2x4-16' S1S1E	M	40.50	*42.00	43.50	37.00	*53.00	*45.00	*45.00	*44.00	*46.00	*43.00	45.00	.....	.....	.....	.....	.....	.....	.....
Douglas Fir No. 1	Dimension 2x4-16' S1S1E	M	39.50	*40.50	43.50	.....	.....	.....	.....	.....	.....	.....	.....	55.00	.....	.....	40.00	46.00	31.00	34.00
N. Carolina Pine No. 1	Dimension 2x4-16' S1S1E	M	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Common Boards No. 1	1x6	M	38.50	*45.00	.....	31.00	.....	*45.00	.....	.....	.....	*48.00	48.00	50.00	.....	.....	35.75	41.00	31.00	33.00
Y. P. Flooring E.G."C"	1x4-10'-16'	M	.....	*66.00	.....	.....	*87.00	*115.00	*90.00	*95.00	*75.00	*78.00	75.00	.....	.....	70.00	.....	84.00	.....	.....
Douglas Fir V.G. No. 2	1x4-10'-16'	M	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	92.50	$70.00	.....	75.00	81.00	67.00	75.00
Red Cedar Shingles	Extra clear 16" 5 to 2	100 sq. ft.	6.00	*5.97	*5.00	.....	*6.20	*6.50	*5.20	*5.04	*6.00	*6.07	7.00	.....	.....	.....	5.00	5.10	4.60	4.75
Cypress Shingles	Extra clear 16" 5 to 2	100 sq. ft.	.....	.....	.....	.....	.....	.....	.....	.....	.....	*6.97	.....	6.50	.....	.....	.....	.....	.....	.....
Composition Shingles	Crushed slate surfaced	100 sq. ft.	8.00	*6.00	5.80	.....	*6.25	.....	*6.00	*5.75	.....	*6.93	.....	.....	.....	5.50	8.00	7.50	9.75	.....
Gypsum Plaster Board	⅜"	1,000 sq. ft.	.....	*39.50	32.00	.....	*53.00	.....	*32.50	.....	*40.00	*45.00	52.00	55.00	.....	36.00	32.00	32.00	.....	.....
Lime	Hyd. Com.	Ton	17.85	*23.20	25.60	14.70	*14.80	15.00	*14.00	.....	*18.00	*27.50	22.50	15.00	.....	18.00	19.00	24.00	20.00	29.00
Building Sand		Cu. yd.	3.50	*2.56	2.50	2.25	*2.50	*1.75	*1.80	*2.23	*3.04	*2.00	2.75	1.15	.....	2.50	2.00	.....	1.50	1.25
Crushed Stone	¾"	Cu. yd.	5.00	.....	2.75	2.25	*3.50	*3.25	*2.50	*2.25	.....	*5.00	2.60	3.00	.....	6.50	3.70	.....	2.50	2.75
Window Glass	Single A 10"x12"	50 sq. ft.	.....	*3.90	4.50	.....	.....	*4.20	*4.50	.....	4.20	*4.50	5.40	5.40	.....	.....	5.00	.....	3.75	4.22
Hollow Tile	8"x12"x12"	Each	.09	.....	.22	.....	.....	*.16	*.18	.....	.....	*.25	.21	.18	.....	.....	.13	.....	.18	.....
Cast Iron Soil Pipe	4" E.H. 13 lbs. per ft.	Ton	.....	.....	.....	.....	.....	.....	*65.00	.....	.....	*77.00	59.00	.....	.....	.....	.....	.....	.....	.....
Steel Pipe	1" galv.	100 ft.	.....	.....	.....	.....	.....	*8.36	*8.57	.....	.....	*9.40	9.40	11.25	11.03	.....	.....	.....	9.90	9.90
Reinforcement Bars	½" square	100 lbs.	3.05	.....	2.90	.....	.....	*2.85	*3.00	.....	.....	*4.00	3.75	4.50	.....	3.42	3.73	3.50	.....	3.05
Structural Steel	Fab. 6" I-beams	100 lbs.	3.45	3.75	3.75	.....	.....	.....	*3.25	.....	.....	*4.00	.....	.....	.....	.....	.....	5.00	3.90	4.30
Gypsum Plaster	Neat	Ton	18.00	*19.50	15.50	.....	.....	*16.30	*19.00	.....	.....	*24.00	24.00	23.00	.....	.....	18.00	15.40	14.80	.....
Roofing Slate	No. 1 Ribbon	100 sq. ft.	.....	.....	.....	.....	.....	*10.75	*16.50	.....	.....	*12.00	.....	.....	.....	.....	.....	.....	.....	.....
Tar Paper, Roofing	2-ply 75 lbs. per roll of	100 sq. ft.	3.50	.....	.....	.....	*2.50	.....	*2.25	.....	.....	*2.60	2.53	3.25	.....	2.60	2.10	3.00	.....	.....
Rosin Sized Sheathing	3-ply 30 lbs. per roll of	500 sq. ft.	1.50	*.74	1.20	.....	.....	.....	*1.15	.....	1.30	.....	1.80	1.50	.....	1.25	1.00	.....	2.00	.....

*Delivered at job

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A group of nationally known experts on various technical subjects allied to building, providing a direct service to architects

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(*b*) That no Committee member has affiliations with any manufacturer;
(*c*) That no Committee member will be called upon for detailed service excepting by special arrangement;
(*d*) That a special editorial article on a subject represented under each of the headings below shall be prepared during the year by the Committee member.

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Specialist in land drainage, soil improvement, surveys, farm arrangement for economical production, purchase of equipment and economical layout of farm buildings with special reference to interior arrangement.

Address inquiries to committee members, care THE ARCHITECTURAL FORUM, 103 Park avenue, New York

THE FORUM DIGEST

A SURVEY OF IMPORTANT CURRENT ARTICLES ON BUILDING ECONOMICS AND BUSINESS CONDITIONS AFFECTING CONSTRUCTION

The Editors of this Department select from a wide range of publications matter of definite interest to Architects which would otherwise be available only through laborious effort

WHY BUILDING COSTS ARE ADVANCING

SINCE June, 1920 the construction cost curve has declined steadily. The heaviest drops from one month to the next were during January, 1920 and October, 1921. The latter drop—16 points or 9 per cent, according to *Engineering News-Record's* Cost Index Number—pictures the final slump of the steel market and labor deflation, and was the last important decline to be recorded. Since then cost has been about the same from month to month, even creeping up.

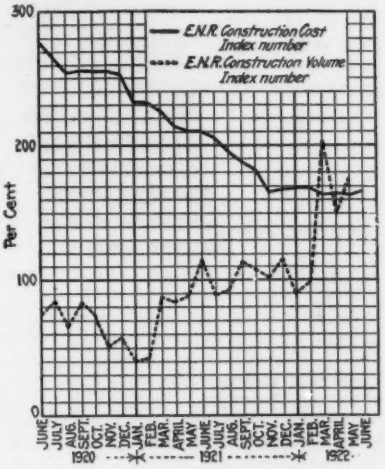
Prices are stiffer, and there is a growing feeling that they may rise generally. Warrant for this feeling may be found in a study of the accompanying chart, in which the *Construction Cost Index* (CC) and the *Construction Volume Index* (CV) are plotted to the same scale. The CV Index shows the rate at which contracts are being awarded compared with 1913 activity. From June, 1920 to June, 1921 the average monthly rate (70 per cent) was 30 per cent lower than in the year before the war—and 1913 itself was a subnormal construction year. On the other hand the average rate for the last 12 months has been 122 per cent, which is 22 points greater than for 1913 and 74 per cent higher than for the preceding 12 months.

Confidence began to return to the construction industry with the opening of 1921. This is clearly reflected in the jump of the CV Index from 43 to 88. By May the 100 per cent level had been reached, activity being equal to the average 1913 rate. This general level was maintained during the rest of the year. Only minor ups and downs of the curve appear during this period.

The abrupt increase in contracts let in February, 1921, followed by a continuance of this higher volume rate, began to show visible effect in November, 1921—10 months after the first impetus. Construction cost climbed slightly. It settled back during February, 1922, but the rise was resumed in March, and the advance since then has amounted to about 4½ points, or nearly 3 per cent.

It is plain that the second great impetus of the last two years—beginning with 1922—has not yet had anything like its full effect upon prices of construction materials. It is not likely that the experience of the first impetus will be repeated in the second instance, and that 10 months will pass before prices react to promised increased demand. There was a reason for this 10-month period in 1921. It would have been a difficult feat to have stemmed the 1920–1921 decline in cost, even if anyone had wanted to do so. Prices had to come down, and only a practically impossible call for materials and labor could have kept them up.

Therefore, even with the increasing prospective demand for materials, prices and labor rates continued to decline until balanced by actual ordering of materials for the new construction. As stated, this steadying took place beginning November.


E.N.R. Construction Cost Index number
E.N.R. Construction Volume Index number
Per Cent
300
200
100
0
JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APRIL MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APRIL MAY JUNE
1920
1921
1922

The construction impetus initiated last January by the final price drop is already beginning to stiffen prices and labor rates. Steel and cement are firm. Brick, on the other hand, is jumping upward in a most unhealthy manner. Lumber is rising generally. The average rate paid common construction labor is slightly higher than a month ago.

Obviously, then, construction cost is due for an increase; how much and for how long cannot be predicted. It is easily conceivable that steel—the material hardest hit in the slide from the peak—may return to $1.75 per 100 lbs. for structural shapes. Last fall the feeling was quite general that this would have been a workable price. As there was practically no actual demand for steel at the time, the market continued to weaken until steel could be bought at $1.30. Future prices of cement depend largely upon the coal situation. Adding $2 to the price of a ton of coal at the mines increases the cost of cement 20c. per bbl. Prices elsewhere are generally steady. Brick prices are already out of reason, but with continued demand and insufficient production there is nothing to prevent still greater inflation.

What will be this increase in construction cost? A guess that would be as good as the next would be 5 per cent.

MEN EMPLOYED IN CONSTRUCTION INDUSTRY

IN the course of discussions regarding the building labor situation it is often of interest to know the number of men engaged in the various building trades. A recent investigation by the Associated General Contractors provides this valuable information.

This tabulation shows the average number of members in good standing in 1922:

Asbestos Workers, Int'l Ass'n of Heat and Frost Insulators	2,100
Bricklayers, Masons and Plasterers' Int'l Union of America	69,999
Bridge and Structural Iron Workers' Int'l Ass'n	16,000
Carpenters and Joiners, United Brotherhood of	313,000
Electrical Workers of America, Int'l Brotherhood of	142,000
Elevator Constructors' International Union	3,846
Engineers, Int'l Union of Steam	16,000
Granite Cutters, Int'l Ass'n of	10,250
Hod Carriers, Building and Common Laborers' Int'l Union	46,002
Lathers, Int'l Union Wood, Wire and Metal	8,001
Marble, Slate and Stone Polishers, Rubbers and Sawyers, Tile and Marble Setters' Helpers, I. A.	1,568
Metal Workers, Int'l Alliance Amalgamated Sheet	24,999
Painters, Decorators and Paperhangers, Brotherhood of	99,274
Plasterers, Operative and Cement Finishers' Int'l Ass'n	24,715
Plumbers and Steam Fitters, United Association of	35,000
United Slate, Tile and Composition Roofers, Damp and Waterproof Workers' Association	3,000
Stone Cutters' Ass'n, Journeymen	4,602
	821,156

Nearly 2,500,000 in Trades

Information in regard to the total number of men engaged in the building trades is in an unsatisfactory condition. This tabulation, based on figures from the 1920 census, shows a total of nearly 2,500,000 men in the building trades:

Brick and Stone Masons	131,257
Carpenters	887,208
Cement Finishers	7,621
Electricians	212,945
Painters, Glaziers and Varnishers (building)	248,394
Paperhangers	18,338
Plasterers	38,249
Plumbers and Gas and Steam Fitters	206,715
Roofers and Slaters	11,378
Stone Cutters	22,096
Structural Iron Workers (building)	18,836
Coppersmiths	5,232
Tinsmiths and Sheet Metal Workers	69,725
Laborers, building, general and not specified	608,075
Total	2,486,069

The difficulty with this table is that it does not include all of the building trades and that it does include under some of the items considerable numbers of men not engaged in building. In some of the groups, particularly carpenters, plumbers and steam and gas fitters, and electricians, men are included who are employed in shops and not in building construction. The item for electricians is particularly misleading as it includes automobile electricians, a large variety of men engaged in electrical manufacture and apparently some of the line men. The item of laborers is very unsatisfactory as it includes a class entitled "general and not specified," which means that this group has been used as a dumping ground for all laborers, the exact nature of whose work was not indicated on the census returns.

REPLACEMENT OF BUILDING TRADES WORKERS

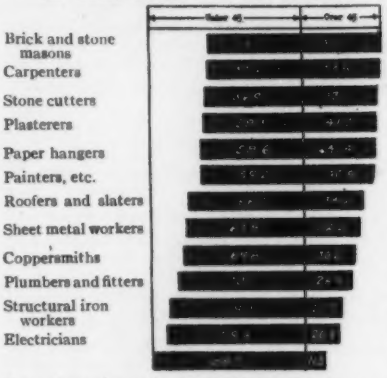
THIS article and the accompanying charts are reproduced from *Index:*

"How many new workers are needed each year in the building trades? That question is of fundamental importance to a rational study of our needs in the fields of apprenticeship and trade schools. New workers are needed for three purposes: to take the places of those who die, of those who retire, and to provide for the increases which should accompany a growing population. It is evident that the number of deaths and retirements, in any trade, will depend largely upon the ages of the men engaged in that trade, for old men die faster and retire sooner than younger men. Diagram I shows the number of people engaged in 13 of the building trades and their distribution by age periods, according to the 1920 census.

"The figures given should not be used without reservation as representing the number of workers engaged in building construction, because the census classifications are such that many of those included in some of these groups are working in factories or in other pursuits not connected with the erection of new buildings. With this reservation in mind, however, they may be satisfactorily used for the purposes of the present study.

"The bars in Diagram II show what proportion of the men in each of these trades are over 45 years of age, and what proportion are under that age. It is obvious that the men at the head of this list must be dying off much faster than those at the foot. Those trades which show the greatest proportion of younger men are those which have been recruited largely from young men in recent years. Those with the greatest proportion of older men are the trades which have been receiving relatively few additions from among the youths. The latter are trades whose numbers have been growing slowly or even decreasing, while the former are the rapidly growing trades.

II. AGE TABLE OF ARTISANS

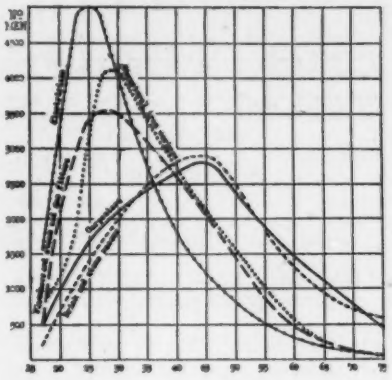


Percentages of men in the building trades who are over and under 45 years of age

"It is unfortunate that the figures at present available from the census bureau do not give us a more detailed age distribution. It would be much better for our present purposes if we knew the number in each 5-year group, that is the number aged 20 to 24, 25 to 29, 30 to 34, etc. However, it is possible from the figures given in the table to construct curves which must represent very nearly the correct distribution, by ages, of the various trades.

"Diagram III shows such a distribution for five important building trades. The curves show for each trade the number of men at each age from 17 to 75 for every 100,000 workers. For each 100,000 electricians, for instance, there are 1,550 who are 17 years old, 5,000 who are 25 years old, and 1,800 who are 40 years old. Similarly, there are 500 carpenters who are 17 years old and 2,800 who are 45 years old.

III. AGE DISTRIBUTION



"The next curve shows how the death rate varies among the male population of the United States according to the life tables prepared by the United States Census Bureau. At age 17, the death rate is 3.65 per thousand; at age 50 it is 15.81, and at age 75, 92.72. A comparison of this curve with the five curves showing age distribution will make it at once evident that the death rates among carpenters and masons must be much greater than among electricians or plumbers."

I. MEN IN BUILDING TRADES IN UNITED STATES IN 1920 GROUPED BY AGE PERIODS

ARTISANS	17–19	20–24	25–44	45–64	65 and over	Unknown	Total
Carpenters	16,541	59,178	412,626	332,064	65,436	1,363	887,208
Painters, glaziers and varnishers (building)	4,377	16,053	126,288	86,972	14,398	306	248,394
Electricians	13,818	47,579	127,309	22,883	1,114	242	212,945
Plumbers and gas- and steam-fitters	6,894	30,636	124,078	42,213	2,654	240	206,715
Brick and stone masons	1,352	7,760	62,707	49,252	10,024	162	131,257
Tinsmiths and sheet metal workers	2,378	8,535	37,675	18,140	2,904	93	69,725
Plasterers	367	2,259	19,630	13,393	2,517	83	38,249
Stone cutters	305	1,340	10,911	8,319	1,201	20	22,096
Structural iron workers	394	2,269	12,151	3,842	154	26	18,836
Paper hangers	268	1,058	9,398	6,618	970	26	18,338
Roofers and slaters	295	1,163	6,253	3,236	417	14	11,378
Cement finishers	63	405	4,553	2,411	171	18	7,621
Coppersmiths	212	755	2,853	1,271	136	5	5,232
Total	47,264	178,990	956,432	590,614	102,096	2,598	1,877,994

ELIMINATING THE ARCHITECT?

IN a somewhat grotesque presentation of the simplicity of absorbing the functions of the architect within the contractor's organization, a member of the Associated General Contractors threatens dire results for the future of the profession. The cause of this outburst is presented in an article which appeared in the *Bulletin of the A. G. C.* We are inclined to agree with some of the general statements in this article, but please, Mr. Contractor, remember that the shoe has been on the other foot many times, just as you say in the last paragraph!

Here is the *causus belli:*

"The vital question of day labor under the general supervision of the architect *versus* the management of the construction of a building by a responsible general contractor comes up again in a case involving members of the A. G. C., wherein work was begun according to the former system with the belief that it would be cheaper.

"In this particular case, the architect made the statement that the job was not awarded, in the first place, to a contractor, because the plans were incomplete, and was not given to anyone at any later date for the same reason. He also asserted, in justifying the methods involved, that a great deal of material and equipment had already been ordered, and a competent foreman had been placed in charge.

A. G. C. Member Protests

"In protesting to the effect that the contractors had not received proper consideration, the A. G. C. member held that

the architect could not have decided that a day-labor job was cheaper than a contract job unless he concluded that a contractor's fee is dead loss, and that in following this same thought the owners should have concluded that a competent draftsman could have been employed to eliminate the architect's fee. He also stated that in view of the great amount of work done by contractors on a percentage or fixed-fee basis, the claim that it was impossible to award the work in question to a contractor was rather unreasonable.

"The contractors submitted to the building committee, acting for the owners, the proposition that if the architect would make an estimate of the cost of the work and would guarantee his estimate with a bond similar to the one required of a contractor, and his estimate should be lower than that furnished by a contractor with the same guarantee, that they would raise no objection. The architect, however, would not do this."

The A. G. C. opinion sent to the member follows:

Minnesota Law Shows Waste from Day Labor

" 'One of the most convincing arguments that we have noted against the performance of construction work by day labor is the passage of a bill by Minnesota, requiring that accurate costs, including all overhead and indirect expense, be kept on every public project amounting to more than $1,500. This law resulted from certain accounting practices of the state departments which enabled them to cover up many of the indirect expenses of day labor work, thus showing costs lower than the usual contract prices. This law was all that contractors and those interested in the economic aspect of the question needed to show taxpayers the wastefulness of day labor work, and it has been effective, we are advised, in demonstrating that the contractor performs the work more cheaply than it can be performed by forces of the state.

Each to His Own Profession

" 'Most architects recognize the need of expert personal service in management such as that performed by the general contractor, and do not approve of the architect's entering into this field unless he is prepared to render better managerial service than the contractor. An article by Sullivan W. Jones, a well-known architect, published in the *Bulletin* of January, 1920, expresses disapproval of either the contractor's performing architectural service or the architect's performing construction service. This view is held, I believe, by the most ethical men.

Two Types of Mind Involved

" 'From such investigation as we have been able to make, no instance has yet come to hand where an architect has attempted the entire service of management and succeeded as well as a capable general contractor. It is commonly recognized that the two types of mind involved in design and execution of construction are essentially different. One is the artistic or scientific, typified in architects or engineers, and which is seldom able to cope successfully with labor, purchasing and the less concrete problems of management. The other type is that typified by an enterpriser, such as the contractor or manufacturer, who possesses the aggressive characteristics essential to efficient management.

" 'Excepting for an individual here and there who is either simply ignorant of the economics of construction, or has a desire to mislead, it is recognized that construction management is a science or profession in itself, the cost of which cannot be avoided merely by dispensing with an individual called the general contractor. The same service must be performed by the architect or engineer, and it is absurd to imagine that they can do it more efficiently than a specialist in this particular business. As you know, some of our members furnish the service of design as well as construction, but they do not attempt to mislead their clients by stating that they eliminate the architect or engineer. On the contrary, they employ the best architects and engineers they can find, and guarantee not only successful work but a fixed cost thereof. The principal thing that they sell on is elimination of the breach between design and construction service.

Architect's Construction Service Involves Expense

" 'The fact mentioned in your letter that the architect is not willing to guarantee cost shows the weakness of his position, and emphasizes a gap in his service which should be easily recognized by any prospective owner. That the architect cannot perform construction service without increased expense is shown by the standard document of the American Institute of Architects, which stipulates that in case of default of the contractor, where the architect is to carry out the work, he shall receive additional compensation for his service of management.

Combining Design and Construction Likely

" 'Unless architects recognize their limitations as well as the true economic factors involved in construction, contractors may find it advantageous to play the same game that your local architect is attempting, namely, to incorporate in their service the function of design and deal directly with the owner, delivering him, without worry, a satisfactory structure. As between the two cases, one where an architect takes on the construction function and the other where a contractor takes on the architectural function, there is little doubt as to which would eventually prove more successful. The contracting, or managerial, mind would become the enterpriser who guarantees his service from start to finish, and the architect, or rather those men having architectural minds, would be forced into the organization of the enterpriser. The success with which this has been done by certain individuals fully demonstrates its practicability. It appears as one ultimate solution, if co-operation fails to link up design and construction service into a smoothly functioning agency.' "

FINANCIAL AND INVESTMENT OUTLOOK

THE *Straus Investors' Magazine* presents some encouraging facts regarding the financial outlook. The fact that all of the investments made in the bonds of S. W. Straus & Co. are turned immediately into channels of building construction adds interest to its opinion:

"Financial conditions at the midsummer period seem to be more satisfactory than they have been at any time since 1919. This is particularly true in the investment world. The period of extravagant and careless investment which immediately followed the armistice and was succeeded by a disastrous slump in which millions of dollars were lost, has finally been replaced by a substantial market for sound investments.

"Most investors have learned a lesson. Whether victims of unsafe investments or not, they have kept informed on financial matters and they know, if not from actual experience, that safe investment depends upon the most careful study and consideration of both the securities and the offering house.

Demand for Real Estate Bonds

"A year ago, the real estate bond market was beginning to feel the effects of the reaction against speculative ventures. Many men who had never before owned a first mortgage real estate bond began to investigate and discovered that this form of security is one of the safest and best investments on the market. They became real estate bond owners.

"Building is now going on as extensively and perhaps more generally than at any other time since the beginning of the war. The public is absorbing the bond issues as they come out, and the general world of investors and builders shows nothing but confidence and faith in the future of apartment houses and office buildings in good locations in our large cities.

"In the United States, to a certain extent, and throughout Europe, to a much larger extent, there seems to be a general feeling of political unrest. In our own country we have the strike of the railroad shop workers and other branches of the railroad craftsmen. Although the union leaders had predicted that this strike would entirely paralyze rail traffic throughout the country, the general public has as yet had little indication that the strike order has gone into effect. The railroad heads, on the other hand, assured the patrons of the lines they control that the passenger traffic would not suffer the least change of schedule. This too is something of an exaggeration, for New York during the first two days of the strike found its suburban railroad service sadly disorganized.

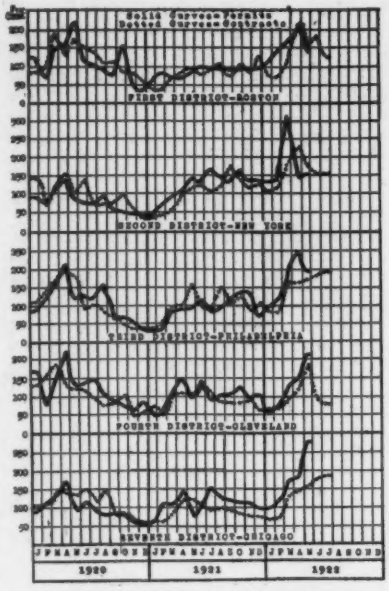
"As a whole, however, the railroad strike has caused scarcely a ripple in the tranquil life of the average American. That the strike, if it continues, will make itself felt in the investment world is almost certain, but it is not probable that any serious consequences will result unless the trouble spreads to other branches of the railroad brotherhood."

COMPARISON OF BUILDING PERMIT AND CONTRACT VOLUMES

AN interesting question which has often been advanced by those interested in following the volume of building construction refers to the possibility of anticipating the volume of contracts to be let by a consideration of the volume of construction involved in the total of building permits issued.

Index, the statistical service publication of the Associated General Contractors of America, has recently presented an analysis of this question which provides a definite answer:

"The purpose of the diagram included here is to test the question whether it is true that, from the value of permits issued in any month, a valid conclusion may be drawn as to the value of contracts likely to be let in the following month. We have already shown in previous issues of *Index* that there seems to be no such sequence as regards the country as a whole. In this diagram we have tested the question for each of the five districts, separately. In each section of the diagram the solid curve represents the fluctuation in permits issued, and the dotted curve the contracts let; here the percentages which the figures for each month show are the average monthly figures for the two years, 1920 and 1921. The curves prove conclusively that in none of the districts is there any such connection between permits and contracts as that just suggested.


FIRST DISTRICT—BOSTON
SECOND DISTRICT—NEW YORK
THIRD DISTRICT—PHILADELPHIA
FOURTH DISTRICT—CLEVELAND
SEVENTH DISTRICT—CHICAGO
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1920
1921
1922

Permits issued in principal cities and contracts let in entire territory, for five Federal Reserve Districts, in per cent of the monthly average of 1920 and 1921.

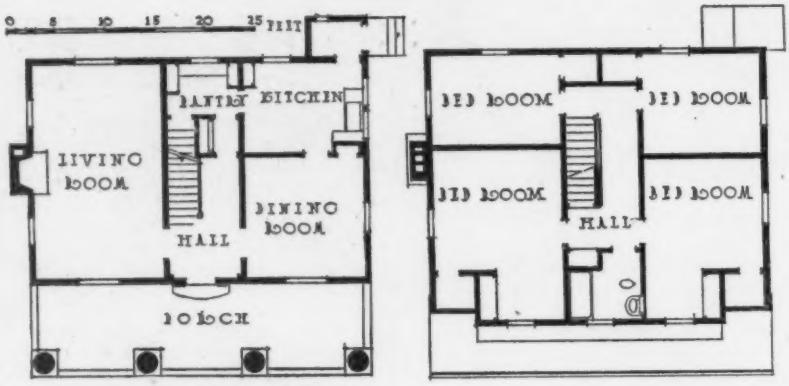
"In no district can one safely say that an increase or a decrease of permits in one month will be followed by a similar increase or decrease in contracts during the next month. It is evident that permits fluctuate more violently than contracts; that they both show a good deal of irregularity from month to month, but that, upon the whole, they tend to go up and down together. It is evident from the curves that the effect of the recent building boom has been most marked in the New York and Chicago districts, less so in the Boston and Philadelphia districts, and least in the Cleveland district."

NATIONAL ELECTRICAL SAFETY CODE

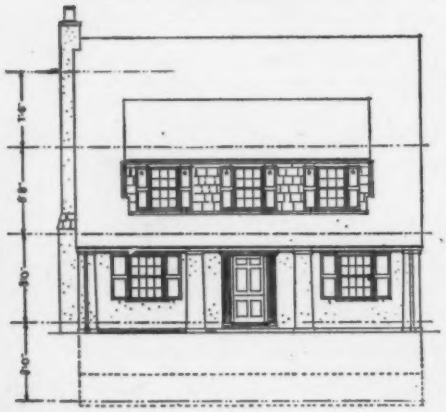
THE American Engineering Standards Committee, by letter ballot, has approved the National Electrical Safety Code of the Bureau of Standards which covers the generation, distribution and utilization of electricity for power, light and communication.

In making public this decision, the Standards Committee announces that there is now in process of formation a thoroughly representative sectional committee to consider any revisions of Part 2 of this Code, "Rules for the Installation and Maintenance of Overhead and Underground Electrical Supply and Signal Lines," which may be deemed necessary by any of the interested parties.

Monthly Estimates on Typical Small House



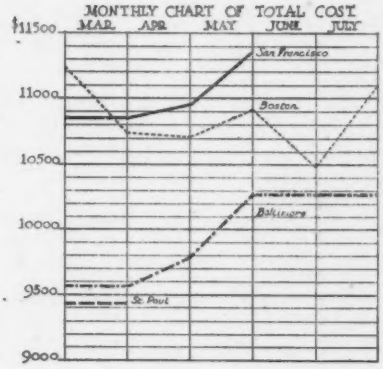
Floor Plans and Elevation of Typical House on Which Estimates Are Based



WE have submitted working drawings of this house, together with a quantity survey of materials, to a representative contractor in each of the cities named, and have secured bona fide estimates which are tabulated below. Specifications are in accord with good practice in the several localities as found in houses of this size built under the supervision of architects. The figures are for the cost complete, including contractor's overhead and 10 per cent profit, but excluding architect's fee.

The cubage of the building is figured from the first floor area exclusive of porches and a height measured from 6 ins. below cellar floor to half point of gable, to which is added cubage of kitchen entry and half the cubage of porch, taking height from footings to plate of dormer.

COST OF HOUSE (Cubage, 27,150 ft.)

	June	July	August
Baltimore	$10,272.50	$10,272.50	$10,272.50
Cu. Ft.	.378	.378	.378
Boston	$10,906.50	$10,480.91	$11,106.76
Cu. Ft.	.401	.386	.409
San Francisco	$11,347.00		
Cu. Ft.	.417		

The variation in price in the Boston territory is accounted for in June by reductions in brickwork, plastering and stucco which were more than offset in July through increases in plumbing, heating, painting and finish lumber.